

Editorial

**Artificial Intelligence In Dentistry: Chances And Challenges.**

Artificial Intelligence (AI) is rapidly transforming the field of dentistry by improving diagnostic capabilities, treatment planning, and overall patient care. AI refers to computer systems that can perform tasks requiring human intelligence, such as learning, reasoning, and decision-making. In dentistry, AI primarily uses machine learning and deep learning algorithms to analyse large datasets, including radiographs, intraoral scans, and electronic dental records. These technologies are reshaping traditional dental practices and opening new possibilities for precision and efficiency.

One of the major opportunities of AI in dentistry is enhanced diagnostic accuracy. AI systems can analyse dental images to detect early signs of dental caries, periodontal disease, periapical lesions, and even oral cancers with remarkable precision. Early detection allows for timely intervention, improving patient outcomes and reducing the need for invasive procedures. AI also supports predictive analytics, enabling dentists to anticipate disease progression and tailor individualized treatment plans. In orthodontics and prosthodontics, AI-driven software assists in designing aligners, crowns, and implants with high accuracy, improving both function and aesthetics.

Another significant advantage is increased efficiency in clinical and administrative workflows. AI can automate repetitive tasks such as appointment scheduling, billing, and patient record management, allowing dental professionals to focus more on patient care. Virtual assistants and chatbots can handle patient inquiries and follow-ups, enhancing communication and satisfaction. Furthermore, AI contributes to dental research by analysing vast datasets quickly, facilitating evidence-based decision-making and accelerating innovation.

Despite these benefits, several challenges limit the widespread adoption of AI in dentistry. One major issue is the availability and quality of data. AI systems require large, standardized, and high-quality datasets for training; however, dental data is often fragmented and inconsistent. Ethical concerns also play a critical role, particularly regarding patient privacy, data security, and informed consent. Ensuring compliance with data protection regulations is essential to maintain patient trust.

Another challenge is the "black box" nature of many AI algorithms, where the decision-making process is not easily interpretable. This lack of transparency can reduce clinicians' confidence in AI-assisted diagnosis. Additionally, the high cost of implementing AI technologies, along with the need for technical expertise and training, poses barriers for many dental practices. Resistance to change among professionals and concerns about job displacement further slow adoption.

In conclusion, AI holds immense potential to revolutionize dentistry by enhancing diagnostic precision, improving efficiency, and supporting personalized care. However, overcoming challenges related to data quality, ethical considerations, cost, and integration is crucial. With continued advancements, proper regulation, and increased awareness, AI is likely to become an integral component of modern dental practice, benefiting both clinicians and patients.

**References**

1. Schwendicke, F., Samek, W., & Krois, J. (2020). Artificial Intelligence in Dentistry: Chances and Challenges. *Journal of Dental Research*, 99(7), 769-774. <https://doi.org/10.1177/0022034520915714>
2. Ding, H., Wu, J., Zhao, W., Matinlinna, J. P., Burrow, M. F., & Tsoi, J. K. H. (2023). Artificial intelligence in dentistry: A review. *Frontiers in Dental Medicine*, 4, 1085251. <https://doi.org/10.3389/fdmed.2023.1085251>
3. Chen, Y. W., Stanley, K., & Att, W. (2020). Artificial intelligence in dentistry: Current applications and future perspectives. *Quintessence International*, 51(3), 248-257. <https://doi.org/10.3290/j.qi.a44006>
4. Khanagar, S. B., Al-Ehaideb, A., Vishwanathaiah, S., et al. (2021). Developments, application, and performance of artificial intelligence in dentistry - A systematic review. *Journal of Dental Sciences*, 16(1), 508-522. <https://doi.org/10.1016/j.jds.2020.06.019>
5. Topol, E. J. (2019). High-performance medicine: The convergence of human and artificial intelligence. *Nature Medicine*, 25(1), 44-56. <https://doi.org/10.1038/s41591-018-0300-7>
6. Esteva, A., Robicquet, A., Ramsundar, B., et al. (2019). A guide to deep learning in healthcare. *Nature Medicine*, 25(1), 24-29. <https://doi.org/10.1038/s41591-018-0316-z>

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