

## Digital Dentistry – Biting into the New Horizons

Digitalization has revolutionized day-to-day operations and enhanced capabilities of manual proficiencies. The rise of Internet and communication technologies is having an enormous impact on modern society, and the Indian healthcare system is also evolving exponentially to keep up with the fast pace of digitalization. Digital evolution has started gradually revolutionizing the practice of dentistry using digital tools to improve accuracy and precision in clinical interventions, thus enhancing positive patient outcomes. In addition, digital innovative technologies are rapidly influencing preventive as well as health promotion measures.

Research, development, and innovation, artificial intelligence (AI), virtual reality (VR), augmented reality (AR), machine learning (ML), three-dimensional (3D) printing, and teledentistry have changed the profile of dentistry along with digitalization. Digitalization involves the conversion of data from analog (continuous information) to digital (binary information) along with the computerization of information and the dissemination of such technologies and techniques into all aspects of living and business. Each of these interconnected processes has transformed dentistry, impacting diagnostic possibilities and the organization of dental practices, as well as the dentist–patient dynamic. Digital technologies are being used in a variety of dental specialties, including restorative dentistry, orthodontics, implant dentistry, and cosmetic dentistry, augmenting the probability to plan highly accurate and patient-centered oral health care. The introduction of digital devices (intraoral/extraoral face scanners and cone-beam computed tomography with low-dose radiation) and processing software (computer-aided design/computer-aided manufacturing prosthetic software, software for planning implant surgery) together with new esthetic materials and powerful manufacturing and prototyping tools (milling machines and 3D printers), is revolutionizing dental profession. The expansion of digital dentistry to include the use of AI and ML algorithms has further improved the effectiveness and efficiency of dental diagnoses, treatment planning, and prosthetics. AI and ML algorithms are also being used to control robotic dental systems to perform specific dental procedures with greater precision and accuracy, thereby greatly reducing the chances of manual errors. Digital technology has increasingly found its utility in patient administration and practice management. The population-based linkage of patient-level information can be used to create new approaches for research such as assisting with the identification of previously unidentified correlations of oral diseases with suspected and new risk factors and furthering the creation of new treatment and prevention concepts. One step further is teledentistry that

offers oral health services at a distance and better enables patient self-management. The field of dental education has also been influenced by Midas touch of digital world with the use of VR and AR simulators for training of dental professionals. Furthermore, the continuous adaptation and evolution of digital technology should also be anticipated in near future as its practical implementation at large is still in infancy.

Improved care and patient-centered care are two key driving elements influencing the demand for digital dentistry. The global digital dentistry market size in terms of revenue was estimated to be worth \$7.2 billion in 2023 and is poised to reach \$12.2 billion by 2028, growing at a compound annual growth rate (CAGR) of 10.9%. The Indian digital dentistry market was valued at \$47.6 million in 2023, which is expected to increase over the forecast period at a CAGR of 5.4%.

It is imperative to realize that incorporating digital dentistry into the mainstream work system is a tedious and long journey which requires a carefully organized and executed infrastructure. Ultimately, the decision to incorporate digital dentistry into dental practice should be based on careful consideration of acceptability, affordability of the patients, as well as availability of resources for this digital transition.

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