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Mini-Review

Artificial Intelligence-A New Millennium in Dentistry

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Abstract

Today the world is rapidly progressing towards digitalization. Humans have re-formed intelligence for better human decision making and to relieve themselves of the stupendous workload. Artificial intelligence can act as a supplementary tool to improve life. Every sphere of the world has adopted the artificial intelligence with great enthusiasm. Artificial intelligence has changed the horizons of medical and dental field too. It has enormous fields of application which have made dentistry to reach another level. However, this advancement in technology is still at budding stage. There is a need for the dentists to be mindful about its implications for a worthwhile clinical practice in near future. This article is an attempt to highlight the role of artificial intelligence in dentistry.

Keywords: Artificial Intelligence; Dentistry; Applications

Introduction

Technology has become an integral part of human life. Recent advent in the field of technology has revolutionized every field including dentistry. Many new technologies have been established which are based on the principles that try to imitate the human brain functioning to develop solutions that do not just follow the instructions which are pre-programmed but also have some characteristics of the human's such as the reasoning ability and experienced learning from practice without being programmed manually. Artificial Intelligence is defined as a field of science and engineering concerned with the computational understanding of what is commonly called intelligent behaviour and with the creation of artefacts that exhibit such behaviour. The application of artificial intelligence remarkably changed the horizons of Dentistry. Right from education to data acquisition to even performing virtual surgeries all are made possible with the introduction of artificial intelligence [1].

Applications of Artificial Intelligence in Dentistry

Dental Education

Clinical dentistry is more important aspect of dentistry for acquiring better dental skills and enhancing patient care. Traditionally preclinical work was performed on phantom heads or simulators but with the advent of artificial intelligence, now it is possible to practice on virtual patients. These virtual patients are communicating and the training sessions can be performed numerous times till the student masters over the subject prior to actual handling of real patients thereby reducing the risk of iatrogenic trauma. This method of practice is more efficient, economical and consistent [2].

Data Management, Diagnosis and Treatment Planning

Data management, diagnosis and treatment planning can excel to a new plane of implementation with the artificial intelligence. It can assist in scheduling and managing regular appointments and alerts the patients and dentists about check-ups whenever there is any change in lifestyle indicating increased vulnerability to dental diseases. Artificial intelligence can be helpful in classifying suspicious oral lesions into premalignant and malignant lesions thereby improving the quality of diagnosis and treatment planning. It also delivers tele-assistance in cases of dental emergencies when the dental health care professional cannot be contacted. Use of intraoral scanners and cameras has given a major advantage in the process of diagnosis and treatment planning [3].

Oral and Maxillofacial Radiology

Artificial intelligence can be combined with imaging technologies like MRI and CBCT to recognize any abnormality that can remain unnoticed to the human eye. It can also be helpful in accurately locating landmarks on radiographs [4].

Orthodontics

Artificial intelligence will soon become the future of Orthodontics making diagnosis, treatment planning and treatment monitoring easier. Dental impressions are replaced by digital impression by introduction of intraoral scanners. With the help of these 3D scans, aligners can be printed, and treatment can be customized. Artificial intelligence software helps in predicting movement of teeth and final outcome of the treatment. The combination of Artificial intelligence and aligners provide accurate treatment and decreases the chances of error and time for treatment. Virtual reality simulation (VRS) technology is used to simulate the facial profiles post treatment. This enables the dentist to efficiently design the aesthetics and also acts as a motivational tool for the patient [5].

Prosthodontics and Implantology

Fabrication of prosthetic restoration has become easier with CAD/CAM technology. Artificial intelligence plays a major role in identifying the type of bone, cortical thickness for making precise surgical guides for pacing implants [2].

Pediatric Dentistry

Artificial intelligence enabled restorative dentistry with CAD-CAM are very beneficial to paediatric restorations. Pain control with Artificial intelligence enabled devices is the new, smarter way towards injection free pediatric dental practice. Behaviour modification in Pediatric Dentistry became simpler with the invention of various 4D goggles, eye tracking system, movies, animations, and virtual reality-based games.

Oral and Maxillofacial Surgery

The biggest application of Artificial intelligence in Oral Surgery is the advent of robotic surgery where simulation of human body motion and human intelligence is achieved. Artificial intelligence software programs assist the surgeon to plan surgeries with less operation time and better accuracy [1].

Conclusion

Artificial intelligence is changing the prospects of dentistry in a great way. Artificial intelligence application based dentistry is not a myth but turning into a reality. However the fact cannot be denied that Artificial intelligence is still in budding stage and inspite of Artificial Intelligence systems being a great asset in dentistry and dental education; it can only assist the clinician in performing the tasks efficiently, but in no way replace the intellect of the human knowledge, skill and treatment planning.

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