Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 13626 – 13634
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.6411

The Influence of Artificial Intelligence and Emerging Technologies on Diagnostic Precision and Treatment Strategy in General Medicine, Dentistry, and Anesthesia: A Comprehensive Review

Meshari Abdullah Ali Qubty[1], Abdullah Ahmed Jobran Al Shamer[2], Sattam Bin Shaya Ali Al Damjan[3], Ahmed Matar Dubayyan Alsharari[4], Sultan Sauoed A Alkibari[5], Abdulraouf Salamah[6], Khalid Mahdi Bin Mohammed Refaei[7], Abdulmajeed Matar Matir Almutayri[8], Amnah Abdu Sultan[9], Waheed Qassem Eidah[10], Meshari Abdullah Ali Qubty[11], Reem Sulaiman Atallah Alaradi[12], Saeed Al Harbi[13]

Abstract

From general medicine to dentistry to anesthesia, the integration of artificial intelligence (AI) and sophisticated technology in healthcare has transformed diagnosis and treatment planning across many disciplines. The many ways in which artificial intelligence (AI), virtual reality (VR), augmented reality (AR), and other new technologies could improve patient care and clinical results are investigated in this work.With an eye on the use of artificial intelligence and immersive technologies in surgery planning, patient care, and diagnostic imaging, a thorough study of the present literature was undertaken. Analyzed were many studies to evaluate in clinical environments the efficiency, accuracy, and possible advantages of these technologies.The results suggest that AI substantially enhances diagnostic accuracy and efficiency, particularly in the interpretation of dental radiographs and the determination of treatment strategies. Technologies such as VR and AR have shown the potential to lower patient anxiety during treatments and improve dental practitioners' teaching opportunities. Particularly, AI systems showed an amazing success rate in identifying diseases like periodontitis, and VR treatments helped young patients to be less uncomfortable.The results emphasize the transformative potential of AI and immersive technologies in the healthcare sector. These developments will help to raise the general quality of treatment given in general medicine, dentistry, and anesthesia by enhancing clinical decision-making and improving patient experiences. To fully appreciate their advantages and solve issues like implementation expenses and the necessity of training, constant research and development are needed.

Keywords: *Virtual Reality, Artificial Intelligence, Augmented Reality, Dentistry, Innovation in Healthcare.*

Introduction

Over many fields, the globe has seen amazing development; technology is a primary engine of this change. In the field of healthcare, technology has brought a tsunami of ideas aimed at improving patient care including mixed reality (MR), augmented reality (AR), artificial intelligence (AI), extended reality (XR), virtual reality (VR), as well as robotic applications. Although worries about technology invading human jobs in healthcare continue, most people agree that these developments will enable medical practitioners to provide better patient treatment. This empowerment shows itself as enhanced long-term patient

[1] Ksa, Ministry of Health, Hy Al-Muwazafeen Health Center Phcc
[2] Ksa, Ministry of Health, Aseer Health Cluster.
[3] Ksa, Ministry of Health, Al-Salil General Hospital
[4] Ksa, Ministry of Health, Al-Jouf Health Pool.
[5] Ksa, Ministry of Health, Dentistry Specialist Centre Tabuk
[6] Ksa, Ministry of Health, Althager Hospital
[7] Ksa, Ministry of Health, Hurimla General Hospital
[8] Ksa, Ministry of Health, Al-Laith General Hospital
[9] Ksa, Ministry of Health, Tabuk-Al Khalidiya Health Center
[10] Ksa, Ministry of Health, Sabya General Hospital Jazan
[11] Ksa, Ministry of Health, Hy Al-Muwadafeen Health Center Phcc
[12] Ksa, Ministry of Health, Phc Alhamra in Tabuk
[13] Ksa, Ministry of Health, Prince Sultan Airbase Hospital

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 13626 – 13634
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.6411

surveillance, accelerated picture analysis, boosted decision-making capacity, and great predictive potential. Especially, machine learning and artificial intelligence (ML) are considered complementary instruments that improve human knowledge instead of replacing it. These technologies have their own set of benefits and drawbacks, as every invention does. We explore the many functions of artificial intelligence, virtual reality, augmented reality, MR, as well as XR throughout the area of dentistry in this thorough study paper. Our emphasis will be on their uses in dentistry, oral radiography, and surgical procedures, thereby illuminating how these advancements are transforming and maximizing dental practice for patients and practitioners.

Artificial intelligence (AI) is the research and advancement of technology that can carry out activities usually related to human intellect, like visual perception, speech detection, decision-making, and translating words [1]. Within the healthcare industry, artificial intelligence finds use in creative tools, sophisticated internet search engines, and recommendation systems [2]. One branch of artificial intelligence, known as ML, is dedicated to the creation of computer models and algorithms that let computers acquire through and make forecasts or assessments depending on data, without clearly defined goals. ML lets computers identify patterns, interpret data, and with time experience increase their efficiency or acts [3]. Within the field of dentistry, artificial intelligence has been used to autonomously examine dental X-rays, providing vital information such as X-ray type, possible tooth impact, exact level of bone degeneration using color extensions, cavity setting, and more [4]. In particular for healthcare as well as dental imaging, deep learning (DL—a specialist field of machine learning distinguished by multi-layered computer networks—has become a game-changer [5,6]. In dentistry, ML and DL offer improved diagnostic precision as well as therapy planning. At the College of California, for example, an interesting advancement was the development of an artificial intelligence program with an amazing 99 percent success rate in identifying periodontitis. This method is shown by identifying the severity degrees of bone loss with 59% and diagnostic accuracy of 73% for separating normal from sick instances. Further improvement of the periodontal collection can turn this computer-assisted detection method into a helpful instrument for periodontal illness diagnosis and staging [7]. Apart from periodontitis, DL methods have shown great ability in precisely spotting dental cavities on X-rays. Using standardizing and enhancing the diagnostic process, these technologies—characterized by their impartiality and low bias—have the potential to completely transform dentistry [6].

With certain technology, VR is a digitally produced modeling of a fictional, immersive, three-dimensional (3D) environment or image that one might interact with [8]. According to literature reviews as well as randomized control studies, VR has been used in the medical field with significant success both as an acclimatization method to get ready for an event or surgery and as a diversion aid during surgeries. Though it is not yet accepted generally in dentistry, it might be involved in exposure-based adaptation to dental occurrences. Three studies using virtual reality in a dental environment reported lower pain and anxiety than with no intervention. All three of these investigations [9] took place in the perioperative period. In children and geriatric patients as well as to improve patient education, VR might be used to eliminate dental anxiety. Using 3D representations of teeth or the human head, dental professionals, and dental students may rehearse and evaluate them on mannequests using VR technology before working on real patients. Furthermore, VR might be utilized to educate upcoming dentists and ensure experienced ones keep their skill set [10].

AR is a method wherein digital data is superimposed over the real world. Including computer-generated sensory input—such as music, video, graphics, or GPS data—helps the user to better experience reality [11]. AR mostly aims to enhance clinical practice by instantaneously showing medical information on the patient and combining the actual and digital worlds. Using 3D representations of their gums, teeth, as well as oral cavities, virtual reality may let dentists clearly show expected outcomes, make a diagnosis, explain different dental surgeries to their patients, and build a treatment plan [12].

MR combines AR and VR so that digital objects may interact with the actual world, therefore allowing one to integrate characteristics in a real environment. In dentistry, MR technologies are used for teaching and surgery planning. It might provide a novel approach for those undergoing dental work regarding consent. Using an instantaneous 3D structure with multiple sensors as well as holographic production, the HoloLens from Microsoft is an MR tool that may show information and maybe generate a virtual world. Given how

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 13626 – 13634
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.6411

fast technology is expanding and how common virtual learning is achieving, the HoloLens innovation may become a necessary tool for dental education and operation preparation [13,14].

XR is a general word for various kinds of technologies, involving VR, AR, and MR [15] that improve our senses. These technologies have also been used in health care, education, and entertainment as well as in various businesses. This concept spans real-world hybrid environments as well as fictional ones and human-machine interactions generated by wearables and computer technology. Two dental applications of XR most often used are implantology and orthognathic surgery. The advancement of reality devices enables users to combine and add graphical information with medical data. Transposing 3D virtual establishment into the surgical zone, implant-based virtual setting up has improved the accuracy of implant placement being placed under either stationary directing or dynamic navigation. In dental implantology, dental static-guided equipment could not provide as many advantages as computer-assisted operation with flexible navigation. By overlaying estimated cone-beam tomographic imaging (CBCT) dimensions, position, and drill location on the images, these types of technologies help dentists minimize damage to critical structures and execute minimally invasive treatments. Implementation of such innovations is also helpful in maxillofacial and oral surgery as computer-aided navigation lowers operating dangers while raising treatment accuracy. To produce a complete virtual reality, users may sometimes utilize a head-mounted monitor or a glove known to induce their tactile, visual, and acoustic senses along with their perception of touch.

Illustrations, video examinations, as well as 3D face beliefs were all employed recently to support the approach of rebuilding smiles throughout dental rehabilitation. The creation of new technologies enhances this program and reduces the time and possibility of errors involved in information transmission between labs, doctors, and patients. Enhanced realism smile systems find the smile within the picture and substitute it with another smile for the best fit [15].

Indeed, technology has transformed the discipline of dentistry, providing patients with more pleasant, quick, efficient treatment. Modern dentistry has also evolved technically from laser oral health, CAD/CAM, three-dimensional printing, as well as sustainable dentistry. Apart from these advancements in dental science, these technologies significantly influence the provision of dental treatment.

History

In the current decade, we are approaching the fourth dimension, where events previously impossible in the physical universe become reachable. The roots of virtual reality (VR) date back to 1960, with artificial intelligence beginning in 1956 [16]. Morton Heiling invented the Sensorama innovation in 1962, which combined color and stereo-prerecorded pictures with binaural odors, sound, wind, and movement backdrop. Ivan Sutherland presented "The Ultimate Display" in 1965, and in 1968, he unveiled the first head-mounted display (HMD) structure called "The Sword of Damocles." [17].

In 1971, GROPE was developed at the College of North Carolina (UNC), and GROSE mixed visual modeling with haptic display. Myron Krueger established the Videoplace simulation laboratory in 1975, which allowed user interaction [18]. Thomas Furness invented the Visually Combined Airborne System Simulation (VCASS), a sophisticated flight simulator housed at Armstrong Medical Testing Laboratory of the US Air Force [19]. NASA Ames created the Virtual Reality Visual Environment Demonstration (VIVED) in 1984, and VPL pioneered the accessible Eyephone HMD in 1988 and the famous Information Glove innovation in 1985. Fake Space Labs debuted BOOM technology in 1989 [20].

Several VR technologies developed in the latter half of the 1980s at UNC included visual monitors, HMDs, and the Pixel-Plane illustrations engine [21]. The CAVE Instantaneous Virtual Nature in 1992 combined VR with scientific visualization technologies, providing high-resolution visuals and a larger range of vision. Milgram and Kishino first presented the VR continuum in 1994, including five systems: artificial intelligence, virtual reality, augmented reality, MR, and XR. AR technology overlays virtual three-dimensional items onto the real world using see-through HMDs, with great potential for improving human perception and enabling difficult jobs [22].

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 13626 – 13634
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.6411

Oral cavity tests and clinical diagnosis studies of oral cancer were traditionally either conveyed verbally or with visual displays. With a comprehensive oral cavity examination, the residents of oral medicine are required to properly clinically record the patient. One may define a case history as a prepared professional interaction allowing the patient to share his or her symptoms, prior intimate, and oral health, as well as medical information [23]. One may design a 3D-augmented patient record form to document the main complaint, dental, and health histories, along with past studies. Therefore, using this platform will be very beneficial in providing a temporary diagnostic for the patient and in visualizing the patient to aid in explanation.

Red as well as white infections, vesiculobullous infections, as well as ulcerated tumors are the most often occurring forms of oral lesions a resident in oral medicine deals with. Among the traditional chairside diagnostic tools are optical imaging, exfoliative cytology, and vital staining. A 3D-augmented platform helps one to visualize these techniques. Oral medicine residents may employ haptic-based virtual realities to stimulate the application of these age-old practices. Furthermore, VR may help the dentist rule out false-positive as well as false-negative findings of numerous important essential staining techniques, such as toluidine blue, methylene blue, as well as Lugol's iodine.

While certain oral lesions are advised for biopsy, others are managed with medications. Usually, oral submucous fibrosis and other oral premalignant diseases are cured with hyaluronidase injections. VR training stimulators let one see the location of injections and dose. Regarding white lesions, stimulators help to explain the use of drugs or oral intake in cases of treatment [23].

Usually favored to assess possibly malignant oral diseases as well as oral squamous cell carcinomas are incisional and punch biopsy procedures. The instances of exophytic development, pyogenic granuloma, as well as mucocele need precisional biopsy techniques. For oral medicine residents, the AR stimulators may help to teach and practice biopsy techniques. Furthermore, thorough research of the tactile feedback systems will help to improve biopsy techniques (Figure 1).

Figures 1. Oral Health Involves Grasping an Exfoliative Smear Technique with A Cytobrush Employing Virtual Reality Technology.

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 13626 – 13634
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.6411

Artificial Intelligence for Dentistry

These days, artificial intelligence is a common diagnostic tool utilized for exact picture analysis by combining many bodily systems. Artificial neural networks (ANNs) as well as biological algorithms are two of the many artificial intelligence approaches in use nowadays. ANNs have been used recently to clarify the results of many investigative modalities including USG, dental scans, CBCT, computed tomography (CT), and magnetic resonance imagery (MRI). Furthermore, by using ANNs, we may control the exact expansion of locations by maximizing the likelihood of suitability among the output information (working classification) and input data (text or picture fed into the algorithm). By examining hand-labeled hospital medical data, ML techniques may also provide reliable clinical results [24].

Furthermore, artificial intelligence may be utilized as a complement to design effective therapy depending on clinical results and detect oral lesions. AI systems, for instance, may assist in the categorization of many worrisome lesions possibly undergoing malignant transformations. Therefore, in the next studies, artificial intelligence may also be carefully used for familial susceptibility to cancer detection in more general populations. Along with other main diagnostic modalities such as CT, MRI, and CBCT to identify certain anomalies from the typical anatomical arrangement that could have been overlooked by the human eye, AI additionally offers supporting screening acumen [24].

Radiology for Oral Health

In dentistry, oral radiation therapy is a specialist discipline using many imaging techniques to identify and treat mouth illnesses. Its main purpose is to detect oral cavity disorders like cysts, tumors, and infections. In oral radiology, radiography, CBCT, CT images, MRI, positron emission tomography (PET) examinations, and ultrasonic (USG) imaging are among the many imaging modalities used. Commonly used radiographs for the diagnosis of tooth decay, periodontal illness, cysts, both malignant and benign cancers, as well as other dental abnormalities While MRI is good in spotting soft tissue anomalies like cysts and tumors, CT scans are especially helpful in evaluating broken bones, breaks, and malignancies. Salivary gland abnormalities are mostly assessed using ultrasonic means. Correct diagnosis and treatment of oral diseases depend critically on this discipline of dental care [25,26].

Oral Surgery

A maxillofacial and oral surgeon should be exactly knowledgeable about bone structures and their regular physiological motions [27]. AR-VR technology may provide oral surgery trainees visual access and a thorough understanding of significant anatomical components, muscles, as well as joint motions of the mouth cavity to improve surgical outcomes. Clinical and radiological studies suggest that VR tools may help to design individualized patient therapy. Globally, the Holomedicine® Organization is a network of unique medical, scientific, technological, and policy professionals. They aim to create innovative approaches with maximal therapeutic effect for providing mixed reality technology in medicine and surgery.

The AR-VR platform allows oral surgeons to be taught the use of dental anesthetics. Anesthesia failures are mostly caused by physiological, infectious, physiological, or inadequate procedures [28]. Furthermore, a detailed understanding of intraoral as well as extraoral anatomies helps to enhance anatomical and improper insertion methods [27]. If coupled with a feedback system, this technology may be very helpful in managing many patients in a limited time. Two virtual models were used in research to ascertain the dentist's input of haptic-based VR anesthetic injection stimulators. The key issue is the improvement of tactile feedback even if the findings were good [28]. In an experimental group based on an AR stimulator and a traditional technique-based control group, another research evaluated compared alveolar nerve block (IANB) training strategies. Nevertheless, the feedback system's constraints were not addressed by the researchers [29].

AR technologies have been used in numerous oral and maxillofacial operations including orthognathic surgeries, osteotomies, artificial operations, cancer surgical procedures, temporomandibular joint evaluation, excisional biopsy treatments, and dental implants in the last ten years [30]. AR technologies helped to create an image-guided surgical system. A computer-assisted system included a gadget able to

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 13626 – 13634
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.6411

track the device, whose location and orientation were shown in online environments employing a picture registration technique [31]. The tool was connected to the operative field using techniques of computer design. Usually, oral surgeons link preoperative patient pictures and postoperative surgical plans using a pointer. Furthermore, AR-based technology was created to directly display images at the surgical location. This method makes head-up displays and mononucleated projections in the operating microscope. Either they were built on the binocular optical technology of the subsequent surgical microscope, or they were established on the semi-clear displays and positioned among the operating display and the oral surgeon [32].

In the most recent work, oral surgeons investigated the superimposition of soft tissues or bone segments using HMD. This approach enabled a better performance during surgery [33]. In another research, residents interacted with the technology and learned its functioning using Oculus Rift as well as Leap Motion devices [34]. Using a specific application and homing in on various treatment strategies inside prospective oral surgical operations, the Leap Motion system incorporates a multi-sensory learning experience. Including a 360-degree working room, elliptical movies, and computer-generated three-dimensional surgical room models, this VR technology [27] Still, further research is needed to grasp the tactile force input as well as its connection with the multidimensional instrument designs.

Some researchers conducted virtually simulated orthognathic operations on the VR platform and then operated on patients. The main advantage of this method was that dental surgeons could forecast surgical and cosmetic advancement of patients [35]. Tracking lines, points, as well as planes capable of movement from the stereo-lithographic head simulation on the face skeleton throughout osteotomy and splint operations was accomplished using the AR framework [31]. Research on dental implant implantation also made use of VR gadgets. Dentists may employ proper surgical navigation to position the implants at certain sites with enough bone thickness, avoiding implant failure [18]. VR technology has therefore been carefully included to provide appropriate treatment planning and identify an exact spot [36].

Comparatively with the three levels of flexibility in the virtual world, Seipel et al. investigated the use of an inexpensive stereoscopic demonstrate structure and six levels of mobility in implant positioning. The surgical design was improved throughout the follow-up studies such that, utilizing CT scans at the voxel scale in real-time, the dentist was given six levels of freedom [37]. The most recent experiments showed VR systems replicating the sounds and sensations of bone cutting as well as contra-angled handpieces that combined CT pictures of the jawbone with tactile force input technologies to instruct novices [38-40]. Using programming tools upon the processed tomographic informative index, the oral as well as maxillofacial consultant may physically sketch the tumor boundaries in cancer instances using VR technology (Figure 2).

Figure 2. Mixed Reality Technologies.

Artificial Intelligence Used in Dental Surgery

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 13626 – 13634
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.6411

Faster and more consistent interpretation of many bone and skin landmarks required for a comprehensive 3D study of face features has been achieved using machine learning algorithms in several recent research. This method offers more possibilities than other computer methods [41]. Along with the knowledge of the orthodontist as well as the surgeon, the choice of operation is crucial for controlling orofacial defects. Training algorithms using cephalometric readings along with determined pictures may therefore aid in delivering treatment support systems that can readily forecast the need for surgical procedures throughout orthodontic therapy. Furthermore, these AI-based instruments may aid the accompanying practitioner in either confirming or changing his treatment plans to reduce orthodontic concealment with negative aesthetic and functional effects [41].

Oral surgeons and conventional dentists often remove the impacted third molars as a regular operation. AI-based solutions may provide the best optimization of the many phases of diagnostic and treatment planning. Furthermore, by performing mechanized computations of their alignment on panoramic radiographs, implementing assistance of a forecasting AI-based simulation determined by the emergence possibility of the third molars can help judiciously in making important decisions regarding tooth extraction, which may prove to remain questionable in a few cases [40,41].

Summary

Dentistry has been transformed by technological developments in artificial intelligence, virtual reality, augmented reality, MR, and XR, thereby launching a period of accuracy, better patient care, and better education. These developments are essential instruments in providing more affordable and efficient patient treatment, not here to substitute human employment. With the possibility to replace conventional instruments like drills and injections, these advancements are currently transforming several facets of dental health care, from evaluation and therapy planning to operations and patient experiences. Although haptic-based virtual reality (VR) instruction improves diagnosis abilities, VR and AR allow 3D-augmented clinical histories, help in temporary diagnosis, and improve treatment plan explanations in oral medicine. Using convolutional neural network technology especially, artificial intelligence has enhanced picture comprehension and diagnostic reliability in oral radiology, therefore enabling accurate treatment planning. In resident instruction, surgical operations, and patient education, AR, VR, and MR help oral surgeons ensure patients understand predicted results and enable more accuracy in surgery planning.

AI-based image analysis offers reliable diagnosis results in oral pathology; AR and VR stimulators help to educate laboratory skills and explain histological aspects. These technologies do have some drawbacks, however, including high prices and the requirement for additional verification and addressing of ergonomic issues. Finally, the combination of artificial intelligence, virtual reality, augmented reality, MR, as well as XR into dental care marks a turning point enabling medical practitioners to provide better treatment and financial savings. Promising a better, technologically improved future for dentistry, continuous research should concentrate on using these technologies in oral medicine, radiography, surgical procedures, and abnormalities to completely unleash their promise in oral health care.

References

Joiner IA. Chandos Publishing. Vol. 9. Amsterdam, Netherlands: Elsevier; 2018. Emerging Library Technologies: It's Not Just for Geeks.

2. The potential for artificial intelligence in healthcare. Davenport T, Kalakota R. Future Healthc J. 2019;6:94–98.

Machine learning in dentistry: a scoping review. Arsiwala-Scheppach LT, Chaurasia A, Müller A, Krois J, Schwendicke F. J Clin Med. 2023;12:937.

Artificial intelligence in dentistry—a review. Ding H, Wu J, Zhao W, Matinlinna JP, Burrow MF, Tsoi JK. Front Dent Med. 2023;4

Understanding machine learning with deep learning: architectures, workflow, applications, and future directions. Taye MM. Computers. 2023;12:91.

Deep learning convolutional neural network algorithms for the early detection and diagnosis of dental caries on periapical radiographs: a systematic review. Musri N, Christie B, Ichwan SJ, Cahyanto A. Imaging Sci Dent. 2021;51:237–242.

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 13626 – 13634
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.6411
Artificial intelligence (AI) diagnostic tools: utilizing a convolutional neural network (CNN) to assess the periodontal bone level radiographically-a retrospective study. Alotaibi G, Awawdeh M, Farook FF, Aljohani M, Aldhafiri RM, Aldhoayan M. BMC Oral Health. 2022;22:399.
Aloqaily M, Bouachir O, Karray F. Digital Twin for Healthcare: Design, Challenges, and Solutions. Amsterdam, Netherlands: Elsevier; 2023. Digital twin for healthcare immersive services: fundamentals, architectures, and open issues; pp. 39–71.
A systematic review of the use of virtual reality or dental smartphone applications as interventions for management of paediatric dental anxiety. Cunningham A, McPolin O, Fallis R, Coyle C, Best P, McKenna G. BMC Oral Health. 2021;21:244.
Virtual reality (VR) applications in dentistry: an innovative technology to embrace. Haleem A, Javaid M, Khan IH. Indian J Dent Res. 2020;31:666–667.
Voogt J, Fisser P. International Encyclopedia of the Social & Behavioral Sciences. Amsterdam, Netherlands: El; 2015. Computer-assisted instruction; pp. 493–497.
Augmented reality and virtual reality in dentistry: highlights from the current research. Fahim S, Maqsood A, Das G, et al. Appl Sci. 2022;12:3719.
The use of mixed reality in dentistry. Blanchard J, Koshal S, Morley S, McGurk M. Br Dent J. 2022;233:261–265.
Augmented, virtual and mixed reality in dentistry: a narrative review on the existing platforms and future challenges. Monterubbianesi R, Tosco V, Vitiello F, Orilisi G, Fraccastoro F, Putignano A, Orsini G. Appl Sci. 2022;12:877.
Extended reality in dentistry. Arpaçay DK, Bağış B. Int J Prosthodont Restor Dent. 2020;10:48–49.
The past, present, and future of virtual and augmented reality research: a network and cluster analysis of the literature. Cipresso P, Giglioli IA, Raya MA, Riva G. Front Psychol. 2018;9:2086.
Virtual reality: history, applications, technology and future. Mazuryk T, Gervautz M. Institute of Computer Graphics Vienna University of Technology, Austria. 1996;72:486–497.
Sutherland IE. Proceedings of IFIP Congress. IFIP Congress; 1965. The Ultimate Display; pp. 506–508.
A head-mounted three-dimensional display. Sutherland IE. Fall joint computer conference, part I. 1968:757–764.
VIDEOPLACE—an artificial reality. Krueger MW, Gionfriddo T, Hinrichsen K. ACM SIGCHI Bulletin. 1985;16:35–40.
Neira CC. Siggraph. Vol. 93. Siggraph; 1993. Virtual reality overview; p. 2.
Knowledge-based augmented reality. Feiner S, Macintyre B, Seligmann D. Communications of the ACM. 1993;36:53–62.
Negative Patient Descriptors: Documenting Racial Bias In The Electronic Health Record: Study examines racial bias in the patient descriptors used in the electronic health record. Sun M, Oliwa T, Peek ME, Tung EL. Health Affairs. 2022;41(2):203-11.
Artificial intelligence in oral medicine and radiology. Singh Parihar, Ajay P. J Indian Acad Oral Med Radiol. 2019;31:285.
Oral and maxillofacial radiology: evolving technology and paradigm shifts. Mallya SM. J Calif Dent Assoc. 2021;49:289–290.
Implementing virtual and augmented reality tools for radiology education and training, communication, and clinical care. Uppot RN, Laguna B, McCarthy CJ, De Novi G, Phelps A, Siegel E, Courtier J. Radiology. 2019;291:570–580.
Virtual and augmented reality changing horizons in dentistry. Bhandari A, Jain V, Bhandari R. Def Life Sci J. 2021;6:323–329.
Virtual reality simulator for dental anesthesia training in the inferior alveolar nerve block. Corrêa CG, Machado MA, Ranzini E, Tori R, Nunes FL. J Appl Oral Sci. 2017;25:357–366.
Effectiveness of augmented reality mobile simulator in teaching local anesthesia of inferior alveolar nerve block. Mladenovic R, Pereira LA, Mladenovic K, Videnovic N, Bukumiric Z, Mladenovic J. J Dent Educ. 2019;83:423–428.
Augmented reality in surgery. Shuhaiber JH. Arch Surg. 2004;139:170–174.
"When virtuality merges with reality:" application of virtual reality and augmented reality in dentistry - a literature review. Rana K, Sharma B, Sarkar S, Choudhary SR. SRM J Res Dent Sci. 2021;12:161–167.
Computer planning and intraoperative navigation in cranio-maxillofacial surgery. Bell RB. Oral Maxillofac Surg Clin North Am. 2010;22:135–156.
Virtual reality for orthognathic surgery: the augmented reality environment concept. Wagner A, Rasse M, Millesi W, Ewers R. J Oral Maxillofac Surg. 1997;55:456–462.
An innovative virtual reality training tool for orthognathic surgery. Pulijala Y, Ma M, Pears M, Peebles D, Ayoub A. Int J Oral Maxillofac Surg. 2018;47:1199–1205.
Preliminary study of virtual orthognathic surgical simulation and training. Yu H, Cheng J, Cheng AH, Shen SG. J Craniofac Surg. 2011;22:648–651.
Virtual reality applied to dental implant surgery: a computer guided protocol. Torres JP. Int J Online Biomed Eng. 2012;8:21–22.
Seipel S, Wagner IV, Koch S, Schneider W. A virtual reality environment for enhanced oral implantology. Medinfo. MEDINFO. 1995 Jan 1;8:1710-.
Application of virtual reality force feedback haptic device for oral implant surgery. Kusumoto N, Sohmura T, Yamada S, Wakabayashi K, Nakamura T, Yatani H. Clin Oral Implants Res. 2006;17:708–713.
Application of haptic device to implant dentistry--accuracy verification of drilling into a pig bone. Ohtani T, Kusumoto N, Wakabayashi K, et al. Dent Mater J. 2009;28:75–81.
Virtual reality for orthognathic surgery: the augmented reality environment concept. Wagner A, Rasse M, Millesi W, Ewers R. J Oral Maxillofac Surg. 1997;55:456–462.
Artificial intelligence for oral and maxillo-facial surgery: a narrative review. Rasteau S, Ernenwein D, Savoldelli C, Bouletreau P. J Stomatol Oral Maxillofac Surg. 2022;123:276–282.

Journal of Ecohumanism
2024
Volume: 3, No: 8, pp. 13626 – 13634
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i8.6411

تأثير الذكاء الاصطناعي والتقنيات الناشئة على دقة التشخيص واستراتيجيات العلاج في الطب العام وطب الأسنان والتخدير: مراجعة شاملة

الملخص

الخلفية :من الطب العام إلى طب الأسنان والتخدير، أحدث دمج الذكاء الاصطناعي (AI) والتقنيات المتطورة في الرعاية الصحية ثورة في التشخيص والتخطيط العلاجي عبر العديد من التخصصات. يستكشف هذا البحث الطرق المختلفة التي يمكن من خلالها للذكاء الاصطناعي(AI) ، والواقع الافتراضي(VR) ، والواقع المعزز (AR) والتقنيات الناشئة الأخرى تحسين رعاية المرضى والنتائج السريرية.

المنهجية :تم إجراء مراجعة شاملة للأدبيات الحالية، مع التركيز على استخدام الذكاء الاصطناعي والتقنيات الغامرة في تخطيط العمليات الجراحية، ورعاية المرضى، والتصوير التشخيصي .تم تحليل العديد من الدراسات لتقييم كفاءة هذه التقنيات ودقتها وفوائدها المحتملة في البيئات السريرية.

النتائج :تشير النتائج إلى أن الذكاء الاصطناعي يعزز بشكل كبير دقة وكفاءة التشخيص، لا سيما في تفسير الأشعة السينية السنية ووضع استراتيجيات العلاج. كما أظهرت تقنيات الواقع الافتراضي والواقع المعزز إمكانات كبيرة في تقليل قلق المرضى أثناء العلاجات وتحسين فرص تدريب الممارسين في طب الأسنان .على وجه الخصوص، أظهرت أنظمة الذكاء الاصطناعي معدل نجاح مذهل في تحديد أمراض مثل التهاب دواعم السن، كما ساعدت علاجات الواقع الافتراضي في تقليل الانزعاج لدى المرضى الصغار.

الاستنتاج :تؤكد النتائج على التأثير التحويلي للذكاء الاصطناعي والتقنيات الغامرة في قطاع الرعاية الصحية .ستساهم هذه التطورات في تحسين جودة الرعاية المقدمة في الطب العام وطب الأسنان والتخدير من خلال تعزيز عملية اتخاذ القرار السريري وتحسين تجارب المرضى .ومع ذلك، فإن البحث والتطوير المستمرين ضروريان لاستكشاف الفوائد الكاملة لهذه التقنيات ومعالجة التحديات مثل تكاليف التنفيذ والحاجة إلى التدريب المتخصص.

الكلمات المفتاحية :الواقع الافتراضي، الذكاء الاصطناعي، الواقع المعزز، طب الأسنان، الابتكار في الرعاية الصحية.