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The Role of ChatGPT in Modern Oral and Maxillofacial Surgery-A Narrative Review

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Abstract:
The ChatGPT, a specialized version of the Generative Pretrained Transformer 4 (GPT-4) developed by OpenAI, is a significant advancement in Large Language Models (LLMs). Integrating AI-powered ChatGPT into oral and maxillofacial surgery represents a transformative change in healthcare, improving diagnostics, treatment planning, patient communication, and surgical training. Its rapid analysis of extensive databases ensures precise, personalized diagnosis and treatment strategies, reducing risks and enhancing patient outcomes. ChatGPT enables virtual consultations, educates patients, and acts as a real-time surgical assistant during procedures, while AI-driven techniques simultaneously improve the skills of aspiring surgeons.

Keywords: ChatGPT, Large Language Models, diagnostics, treatment planning

Introduction:
The Chat Generative Pre-trained Transformer (ChatGPT) is an advanced AI tool designed to engage users by providing human-like responses to their prompts. Its extensive training on a diverse range of data enables it to understand and interact effectively, making it a powerful resource for meaningful conversations.. It aims to improve the language processing, communication skills, and overall responsiveness of these bots through text-based interfaces. ChatGPT utilizes advanced deep learning techniques to generate responses that closely reflect human communication when addressing natural language queries. This capability positions it as a notable example of a large language model, highlighting its effectiveness in fostering meaningful interactions and enhancing user experience [1].
Artificial Intelligence (AI) represents a transformative approach that enables a series of actions tailored to accomplish specific tasks. As a prominent branch of computer science, AI possesses the remarkable ability to emulate human intelligence, allowing it to make accurate predictions and tackle complex decision-making challenges effectively. Embracing AI can lead to significant advancements and efficiencies across various sectors [2] [3].

Discussion:
Oral and maxillofacial surgery is a hands-on speciality where surgeons work primarily in the operating room, AI is increasingly being used in oral and maxillofacial surgery at all stages, including screening, diagnosis, therapeutic decision-making, surgical procedures and follow-up[4].
The majority of applications for large language models in oral and maxillofacial surgery have been confined to research and scientific writing, patient communication, and medical education, primarily utilizing GPT-3.5 or GPT-4. Aesthetic procedures, such as blepharoplasty and rhinoplasty, have been the

main focus for these language models. However, traditional oral and maxillofacial topics—including fractures, abscesses, dentoalveolar surgery, orthognathic surgery, implantology, and tumor surgery, including reconstructive surgery—have either not been addressed or are currently underrepresented [5].

AI algorithms have the capability to significantly improve the analysis of CBCT images in relation to dental conditions. By accurately identifying the alignment and location of teeth, as well as evaluating bone quality for implant placement, these algorithms enhance the quality of image processing and analysis. This advancement holds the potential to lead to better diagnostic and treatment outcomes within the field of dentistry[6].

The incorporation of AI-assisted simulations and cutting-edge virtual reality technology within ChatGPT represents a major change in the training techniques for future oral and maxillofacial surgeons. These AI-powered simulations establish a conducive and controlled setting that enables trainees to partake in deliberate practice. This method aids in enhancing their technical skills, honing their procedural expertise, and bolstering their cognitive decision-making capabilities.[7,8,9-11]

These AI-powered tools create a realistic learning environment by simulating various surgical scenarios and complexities [12,13,14]. This training enables learners to deepen their understanding of anatomical details and surgical techniques. Consequently, this intensive environment not only enhances skill development but also significantly improves patient safety standards in oral and maxillofacial surgery. [15].

The application of AI in oral and maxillofacial surgery necessitates careful consideration of its potential to improve patient outcomes, while also addressing the risks associated with data security and patient confidentiality. Furthermore, the ethical concerns surrounding the use of AI focus on issues such as accountability, transparency, and fairness in decision-making processes, particularly when AI algorithms assist physicians in making critical surgical decisions.[18].

The use of ChatGPT can pose risks to patient privacy because it requires the collection and storage of patient data and medical histories to perform its functions. Specifically regarding privacy concerns, ChatGPT has access to personal information from various sources on the internet.

Several key obstacles hinder the implementation of ChatGPT in clinical settings. These include its limitations in understanding complex situations, making logical deductions, and delivering consistent results, which could ultimately compromise patient safety. Although ChatGPT does not have direct access to medical databases, its training in a significant amount of relevant information positions it as a useful tool in addressing various inquiries. While it is not specifically designed to provide clinical advice, its capacity to generate credible and informative responses makes it a valuable resource for many users seeking guidance[19].

Collaboration and coordination among healthcare professionals, AI developers, regulatory bodies, and ethics experts are essential for creating a supportive environment that maximizes the benefits of AI while effectively addressing its associated challenges. This synergy will facilitate the integration of AI in oral and maxillofacial surgery, ultimately improving patient care and clinical outcomes.[20].

Conclusion:

AI-driven ChatGPT is at the cutting edge of innovation in oral a.nd maxillofacial surgery, providing numerous benefits in diagnosing, planning treatment, communicating with patients, and assisting in surgery and training. The integration of this advanced technology signifies a major transformation in our healthcare approach. It not only increases the precision and effectiveness of medical procedures but also

elevates the overall quality of care that patients receive. Surgeons now have access to crucial insights and tools that enhance their expertise and decision-making processes. As research continues to evolve and technology advances, the future holds immense promise for AI-powered innovations, such as ChatGPT, to radically reshape the field of oral and maxillofacial surgery, ultimately leading to improved patient outcomes and streamlined surgical practices.

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