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Leveraging ChatGPT for ophthalmic education: A critical appraisal

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Abstract

In recent years, the advent of artificial intelligence (AI) has transformed many sectors, including medical education. This editorial critically appraises the integration of ChatGPT, a state-of-the-art AI language model, into ophthalmic education, focusing on its potential, limitations, and ethical considerations. The application of ChatGPT in teaching and training ophthalmologists presents an innovative method to offer real-time, customized learning experiences. Through a systematic analysis of both experimental and clinical data, this editorial examines how ChatGPT enhances engagement, understanding, and retention of complex ophthalmological concepts. The study also evaluates the efficacy of ChatGPT in simulating patient interactions and clinical scenarios, which can foster improved diagnostic and interpersonal skills. Despite the promising advantages, concerns regarding reliability, lack of personal touch, and potential biases in the AI-generated content are scrutinized. Ethical considerations concerning data privacy and potential misuse are also explored. The findings underline the need for carefully designed integration, continuous evaluation, and adherence to ethical guidelines to maximize benefits while mitigating risks. By shedding light on these multifaceted aspects, this paper contributes to the ongoing discourse on the incorporation of AI in medical education, offering valuable insights and guidance for educators, practitioners, and policymakers aiming to leverage modern technology for enhancing ophthalmic education.

Keywords

ChatGPT, artificial intelligence, ophthalmology education

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Ophthalmic education is crucial for training future Ophthalmic professionals to provide quality eye care services. As technology advances, new avenues for learning and knowledge dissemination have emerged.[1] Among these, artificial intelligence (AI) language models, like ChatGPT, have gained significant attention due to their ability to process vast amounts of information and generate human-like responses.[2] The advent of AI has brought forth new possibilities in various domains, including medical education. ChatGPT, an advanced language model developed by OpenAI, is one such innovation that holds great promise in revolutionizing the way medical information is disseminated and accessed. However, the question remains whether it can be deemed reliable for ophthalmic education.[3] The purpose of this editorial is to shed light on the potential role of ChatGPT in ophthalmic education and to critically evaluate the reliability of ChatGPT as a source of knowledge in this specialized field.

Understanding ChatGPT

ChatGPT is an AI language model developed by Open AI based on the GPT-3.5 architecture. It is trained on a vast

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corpus of text data and can respond to a wide range of prompts, questions, and inquiries, including those related to ophthalmology.[4] The technology aims to provide helpful and contextually relevant information, but its responses are generated based on patterns in the data it was trained on rather than possessing real understanding or knowledge.[5] Reliability in educational sources is crucial to ensure accurate and up-to-date information is imparted to learners. Ophthalmic education demands high precision and accuracy, considering its critical impact on patient care and vision outcomes. Therefore, it is essential to evaluate ChatGPT's reliability based on several factors.[6]

The advantages of ChatGPT in ophthalmic education

Accessible information and convenience

ChatGPT offers a readily available source of information at the users' fingertips. This accessibility can be particularly beneficial for students, residents, practitioners, and even ophthalmologists seeking quick references or clarification on specific topics.[7]

Real-time supplemental learning

With the ability to interact in real-time, ChatGPT can simulate engaging educational experiences, fostering active learning through interactive discussions with the AI. This can enhance critical thinking and problem-solving skills. As a supplementary resource, ChatGPT can reinforce the knowledge acquired through traditional textbooks and lectures, providing a different perspective on ophthalmic topics.[8]

Virtual patient scenarios and interactive and collaborative learning

ChatGPT can simulate virtual patient scenarios, allowing learners to practice diagnosing and managing eye conditions in a risk-free environment, thus augmenting traditional clinical training.[9] Using ChatGPT can facilitate interactive learning experiences, allowing users to engage in virtual conversations and ask questions related to ophthalmology. In a teaching environment, ChatGPT can stimulate group discussions and foster collaborative learning, encouraging students to explore diverse viewpoints.[10]

The limitations of ChatGPT in ophthalmic education

Lack of critical thinking, expertise and limited contextual understanding

ChatGPT lacks genuine expertise in ophthalmology. It does not possess the experience and clinical judgment that ophthalmic educators or seasoned practitioners have to exercise clinical judgment or diagnose patients. This can lead to potentially incorrect or misleading responses.[11] Therefore, it should be viewed as a supplementary resource rather than a replacement for expert guidance and hands-on training.[12] While ChatGPT can generate coherent responses, it may not fully grasp the context of a question or the nuances of ophthalmic cases. Consequently, it might produce answers that are factually correct but not entirely relevant to the specific query.[13]

Inability to synthesize information and risk of misinformation

Although ChatGPT can retrieve information from its training data, it cannot integrate or synthesize new knowledge. This limitation hinders its ability to explain complex concepts or analyze data comprehensively.[14] If ChatGPT was inadvertently exposed to biased or incorrect information during its training, it might reproduce such content, leading to potential misinformation being disseminated to learners.[15]

Absence of human interaction and data source and training

Ophthalmic education involves a collaborative and interactive process between educators and learners. ChatGPT's lack of human touch may result in a less engaging and enriching learning experience.[16] ChatGPT learns from vast amounts of textual data available on the internet. Its knowledge is not derived from specialized ophthalmic textbooks or peer-reviewed journals exclusively. Consequently, there may be instances where information provided by ChatGPT lacks the depth and rigor demanded in medical education.[17]

Limitations of knowledge cut-off and context and nuance

ChatGPT does not have access to information beyond that date of September 2021. Therefore, any developments or breakthroughs in ophthalmology after this period would not be available to the model. This limitation can hinder its usefulness for staying current in rapidly evolving fields like ophthalmology.[1o] ChatGPT excels in generating human-like responses, but it may not always fully comprehend the nuances and context of ophthalmic concepts. Ophthalmology often involves complex diagnostic and treatment strategies that require precise understanding and interpretation.[18]

The way forward: augmented learning

While ChatGPT shows potential as a supplementary tool for ophthalmic education, it should not replace traditional methods. Augmented learning, which combines AI-powered

platforms with human-led instruction, can capitalize on the strengths of both approaches.[13]

Content curation and critical thinking development

Expert ophthalmologists can curate and validate educational material presented by ChatGPT, ensuring accuracy and relevance.[10] Instructors can encourage learners to critically evaluate ChatGPT's responses, fostering analytical skills and distinguishing between reliable and potentially biased information.[10]

Ethical considerations

Developers should continue refining ChatGPT to recognize and avoid promoting misinformation. Transparent disclosure that ChatGPT is an AI language model should be a priority.[2]

In one of the recent studies by Mihalache et al,[19] the primary aim of the study was to evaluate ChatGPT's proficiency in responding to practice questions for ophthalmology board certification, revealing considerable implications for AI applications in medical training. Using a cross-sectional design, 125 text-based multiple-choice questions from the OphthoQuestions practice question bank were analyzed, showing that ChatGPT correctly answered around 46% of them in January 2023 and approximately 58% in February 2023. The bot performed best in general medicine and struggled with the retina and vitreous category. The length of questions and responses, along with the provision of additional explanations, was not significantly different between correctly and incorrectly answered questions. The study highlighted that ChatGPT's alignment with responses from ophthalmology trainees was 44%. Despite AI advancements, the findings underscore that ChatGPT, in its current form, has limitations and does not sufficiently aid in preparing medical professionals and trainees for board certification in ophthalmology. In an another study by Rojas-Carabali et al,[20] they assessed the diagnostic and management accuracy of an AI-based chatbot, ChatGPT, in comparison to five uveitis-trained ophthalmologists, utilizing 25 standard cases according to the new Uveitis Nomenclature guidelines. While ophthalmologists demonstrated higher diagnostic success (60–92%) than AI (60%), and exhibited a success rate of 76–100% when considering fully and partially accurate diagnoses, the AI system achieved 72%. Notably, there was a concurrence in 48% of the diagnoses and a high agreement of 91.6% in management plans between the AI and ophthalmologists. The results indicate the promising potential of AI chatbots in uveitis diagnosis and management and emphasize the need for further research to enhance their diagnostic precision and recommendation capabilities. Delsoz et al[21] studied the proficiency of large language models like ChatGPT in diagnosing glaucoma from clinical case descriptions, in comparison to senior ophthalmology residents. Using 11 cases of primary and secondary glaucoma from an online database, both ChatGPT and the residents were tested for provisional and differential diagnoses. The results revealed that ChatGPT accurately diagnosed eight out of 11 cases (72.7%), showing comparable or superior performance to the residents, whose accuracy ranged between 54.5% and 72.7%. The study suggests that with enhancements, ChatGPT holds potential for application in clinical settings for efficient and objective glaucoma diagnoses. ChatGPT has also been utilized in assessing patient questionnaire on Optic Disc Drusens,[22] comparative analysis of information on myopia with GPT 3 and Google Bard,[23] compare online patient eye care questions with Ophthalmologists, triage of Ophthalmic conditions,[24] successfully navigating through the French language version of the European Board of Ophthalmology (EBO) examination,[25] assessing the performance in Italian Residency Admission National Exam Compared to 15,869 Medical Graduates,[26] literature review of dry eye diseases,[27] writing operative notes,[28] response for patient based questionnaire on vernal keratoconjunctivitis,[29] and Ophthalmic knowledge assessment and information on common retinal diseases.[30]

In terms of advancements, integrating AI like ChatGPT with imaging technologies in ophthalmology, such as Optical Coherence Tomography (OCT) and fundus photography, could significantly enhance diagnostic accuracy and speed. This amalgamation could aid in identifying and managing a variety of ocular conditions, including diabetic retinopathy, age-related macular degeneration, and glaucoma, at their nascent stages, thereby preventing potential vision loss.[31] Moreover, AI models, when integrated with teleophthalmology, can extend specialty eye care services to remote and underserved areas, addressing disparities in access to eye care. On the ethical side, the usage of AI in ophthalmology raises significant concerns about patient consent, data privacy, and the physician-patient relationship. The dynamic nature of ophthalmological diseases necessitates continuous model training and validation on diverse and updated datasets to ensure AI's clinical efficacy. Obtaining informed consent for using patient data for such continual training is crucial.[32] Also, the reliance on AI for diagnostics and treatment decisions might impact the trust and rapport between the patient and the ophthalmologist. Adequate measures must be in place to maintain the sanctity of this relationship, with clear communication on the role of AI in patient care. Further, addressing the limitations of ChatGPT regarding the lack of recency is vital in the rapidly evolving field of ophthalmology. Emerging therapies, surgical techniques, and clinical trials continually shape ophthalmic practice. Therefore, it's imperative to explore mechanisms for real-time updates and validations for AI models to ensure their reliability and safety in

clinical applications. Additionally, regulatory frameworks and guidelines need to be established and adhered to for ensuring responsible AI use in ophthalmology. This involves developing standardized protocols for model validation, addressing bias, ensuring data security, and establishing accountability in case of erroneous predictions leading to patient harm.[33]

To conclude, ChatGPT, as an AI language model, has the potential to play a valuable role in ophthalmic education. However, it must be utilized thoughtfully and responsibly, acknowledging its limitations. Augmented learning, combining the strengths of AI technology with human expertise, can enhance the educational experience, empowering future ophthalmologists with the best possible skills and knowledge. Ophthalmic education must embrace innovation while staying grounded in evidence-based practices to ensure the delivery of reliable, safe, and effective eye care services. While ChatGPT cannot be considered a stand-alone reliable source for ophthalmic education due to its limitations in data sources, knowledge cut-off, and lack of critical thinking, it does offer benefits in accessibility, supplemental learning, interactive learning, and collaborative learning.[34] As the field of AI continues to advance, it is crucial to monitor and improve the reliability of such models and integrate them effectively into medical education. We recommend that educators and learners exercise caution and discretion while utilizing ChatGPT, ensuring it is used alongside validated and authoritative educational resources. As AI technology evolves, future iterations of language models may address some of the current limitations, making them more reliable educational tools in the years to come.

Consent for publication

The article confirm that appropriate written informed

Declaration of conflicting interests

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Ethical considerations

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