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LETTER TO THE EDITOR

Potential and limitations of ChatGPT and generative artificial intelligence in medical safety education

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Abstract

The primary objectives of medical safety education are to provide the public with essential knowledge about medications and to foster a scientific approach to drug usage. The era of using artificial intelligence to revolutionize medical safety education has already dawned, and ChatGPT and other generative artificial intelligence models have immense potential in this domain. Notably, they offer a wealth of knowledge, anonymity, continuous availability, and personalized services. However, the practical implementation of generative artificial intelligence models such as ChatGPT in medical safety education still faces several challenges, including concerns about the accuracy of information, legal responsibilities, and ethical obligations. Moving forward, it is crucial to intelligently upgrade ChatGPT by leveraging the strengths of existing medical practices. This task involves further integrating the model with real-life scenarios and proactively addressing ethical and security issues with the ultimate goal of providing the public with comprehensive, convenient, efficient, and personalized medical services.

Key Words: Medical safety education; ChatGPT; Generative artificial intelligence; Potential; Limitation

Core Tip: Generative artificial intelligence, represented by ChatGPT, has been experiencing rapid development. We believe that the era of leveraging artificial intelligence for medical safety education has arrived. To make the most of ChatGPT and generative artificial intelligence, it is essential to acknowledge both their strengths and limitations. By remaining vigilant and capitalizing on their advantages while addressing their shortcomings, we can strive to optimize and enhance the performance of ChatGPT and generative artificial intelligence. This ongoing exploration of the seamless integration of medical safety education with artificial intelligence is crucial in providing better medical services to the public.

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TO THE EDITOR

We have read the article by Liu *et al*[1] on medication safety. The findings of that research indicate that age and working status have positive and significant impacts on knowledge scores related to medication risk. Additionally, there is a significant positive correlation between working status and medication behavior scores. Moreover, the scores for knowledge, cultural beliefs, and medication behavior are significantly influenced by individuals' education levels, with higher levels of education leading to higher scores in these areas. This discoveries reported by this study contribute to the literature and provide valuable evidence related to medication safety among Chinese residents. Simultaneously, in combination with other related research, this study highlights the increasingly significant role of education in improving medication safety. Considering patient characteristics, a comprehensive approach that combines online and offline approaches to medical safety education will be a necessary path in the future to reduce medication risk among residents.

The main purpose of medical safety education is to help the public understand fundamental knowledge concerning medications, develop a scientific approach to drug usage, and enhance awareness and acceptance of diseases and medication treatments. These goals, in turn, help individuals avoid the dangerous consequences of such misconceptions in their daily lives. Effective health guidance plays a vital role in changing patients' lifestyles, improving their self-efficacy, and enhancing their overall physical and mental well-being[2]. Traditional methods of providing medication education to residents include one-on-one face-to-face explanations, group lectures, telephone guidance, electronic campaigns, books, magazines, and personalized online consultations[3-5]. Due to the swift development of information technology and the rapid rise of artificial intelligence, AI-based large-scale screening and digital intervention methods have gradually emerged and been applied in practice[6-10]. The global coronavirus disease 2019 pandemic has further accelerated the rapid adoption and widespread use of telehealth based on electronic information and telecommunication technologies[11]. The internet has become an essential source of health information and a medium for empowering patients[12]. Moreover, since the end of 2022, significant breakthroughs have been achieved by large language models, exemplified by ChatGPT[13]. Therefore, in the digital era, exploring generative artificial intelligence technologies such as ChatGPT offers significant opportunities in the field of medical safety education.

The potential of ChatGPT and generative artificial intelligence

ChatGPT, as a typical representative of generative artificial intelligence technologies, is a chatbot developed by OpenAI that utilizes a pretrained transformer language model known as GPT to comprehend and respond to natural language inputs[14]. Its purpose is to provide answers to various questions across different domains[15]. As a technological advancement in the 5.0 era[16], ChatGPT has been applied in numerous fields[17-20], and the health care sector is no exception[21-25].

The advantages of ChatGPT or generative AI (hereinafter referred to as ChatGPT) in the context of medical safety education can be summarized in terms of the following four aspects. First, ChatGPT possesses basic health care knowledge and the potential to conduct medical safety education. Research has shown that without any specialized training or reinforcement, ChatGPT achieved an accuracy rate of approximately 60% in all three subjects of the United States Medical Licensing Examination[26]. In the field of liver transplantation, ChatGPT can provide high-quality answers to relevant questions, making it a valuable resource for patient education[27].

Second, the anonymity offered by ChatGPT allows for better access to authentic patient information[28]. Due to the fear of stigmatization[29], patients may be reluctant to honestly disclose sensitive personal information related to their conditions[30], even resisting participation in medical safety education. By using ChatGPT as a medium for medical safety education, users' concerns with stigmatization can be minimized, encouraging them to honestly disclose crucial information related to their illnesses and thereby enhancing the effectiveness of medical safety education.

Third, ChatGPT can overcome the limitations of time, space, and language, thereby providing the public with more convenient and efficient pharmaceutical and health care services while maximizing resource utilization. ChatGPT can operate efficiently 24/7[31], significantly saving manpower, resources, and time. Users can easily access ChatGPT with just a few clicks, allowing them to receive medical consultations and answers without leaving their homes.

Finally, ChatGPT has great potential with regard to personalized medication education. It can analyze specific patient data to generate tailored treatment recommendations[32] and offer more personalized medical and health care services

and more effective problem-solving approaches. Compared to general health education for the entire public, the use of ChatGPT as a medium for medical safety education based on individuals' medical history, genetic information, and existing knowledge levels is more targeted and can assist users in improving their medical safety knowledge and practical skills more effectively.

The limitations of ChatGPT and generative artificial intelligence

It is worth noting that while generative AI, as represented by ChatGPT, has tremendous potential with regard to conducting medical safety education, its practical application still faces several limitations. First, medical and health care education, as a crucial aspect of the nation's well-being, must possess a high degree of scientific rigor, authority, and accuracy to effectively improve the public's medical knowledge and ensure residents' safety with respect to medication. While ChatGPT has the potential to serve as an information source and can respond actively to users' inquiries, the accuracy and reliability of these responses remain questionable[15,33]. False or erroneous information could have severe negative impacts on public health, even posing threats to people's lives and safety.

Second, ethical considerations pertaining to the use of ChatGPT must be taken seriously[34,35]. In the medical field, health care professionals have legal responsibilities and are bound by professional ethics to ensure the physical and mental well-being of patients. However, with regard to virtual robots such as ChatGPT, such legal responsibilities and moral obligations have yet to be clearly defined. How can the humanistic care of medicine be adequately reflected in their interactions? How can patients' personal information be properly protected? If accidents occur, how should responsibility for safety be assigned? These questions are all important and require thoughtful consideration.

Finally, the inappropriate use of ChatGPT may pose health risks. As ChatGPT operates through the internet and is accessed *via* electronic devices such as smartphones and computers, improper usage may not only fail to achieve the goals of medical and health care education but may even backfire. Prolonged screen time or internet addiction may impede individuals' normal physical activities and sleep, causing harm to their psychological and cognitive development[36].

Directions for future research

Given the potential issues pertaining to accuracy, ethical considerations, and health implications in medical safety education, it is essential to implement more robust measures to intelligently upgrade ChatGPT in the future. On the one hand, ChatGPT must be further integrated with real-life scenarios, making full use of electronic aids such as sensors and cameras to engage in real-time interactions with users. By accurately recognizing users' environments and usage patterns, it can provide a more immersive and authentic educational experience, thereby enhancing the accuracy and relevance of medical safety education.

In addition, all stakeholders should work together to establish relevant usage guidelines, industry standards, and regulatory frameworks to further regulate the application of ChatGPT in the medical field. Additionally, a clear delineation of safety and responsibility risks should be provided. This collective effort can contribute substantially to effectively addressing ethical and safety concerns.

The wave of generative artificial intelligence technologies represented by ChatGPT is approaching with great force and seems to be unstoppable. We firmly believe that only by recognizing the strengths and limitations of ChatGPT in medical safety education and by remaining vigilant and striving to optimize its performance can we fully explore the organic integration of education and artificial intelligence. In so doing, we can harness the potential of ChatGPT to empower medical safety education through technology and provide the public with more comprehensive, convenient, efficient, and personalized medical services.

FOOTNOTES

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