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Short Communication

Evaluating the performance of ChatGPT in preventive and social medicine in medical university examination

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ABSTRACT

Artificial Intelligence (AI) for community health holds transformative potential, offering data-driven insights, virtual health advisories, and efficient resource allocation for improved healthcare outcomes and population well-being. This study evaluates the potential of ChatGPT 3.5, an AI language model, in preventive and social medicine. Using medical exam questions, ChatGPT demonstrated commendable understanding, scoring 62% and 65% in Paper 1 and Paper 2, respectively. While promising for medical education and public health, caution is advised due to occasional inaccuracies, ethical considerations, and the model's inability to replace human expertise. Refinement efforts are crucial for harnessing ChatGPT's full potential in enhancing medical education and positively impacting public health outcomes. Further research should focus on real-world applications and addressing limitations for responsible integration.

Keywords: Artificial intelligence, ChatGPT, Community Medicine, Preventive medicine, Social medicine

INTRODUCTION

The integration of advanced artificial intelligence (AI) language models like ChatGPT into medical education and public health initiatives represents a significant step towards revolutionizing how information is disseminated and utilized in these fields. The collaboration between OpenAI and Microsoft has further expanded the reach of this technology, making it potentially more accessible to a wider audience.[1,2]

In the context of medical education, ChatGPT can serve as a valuable tool for students and professionals alike. Its ability to generate coherent and contextually relevant responses can enhance the learning experience by providing instant access to a vast amount of medical knowledge. This can be particularly beneficial in disciplines like preventive and social medicine, where a comprehensive understanding of public health principles is crucial.[3]

However, it is important to approach the implementation of ChatGPT in medical education with a critical mindset. While the model has impressive capabilities, it also has inherent limitations such as occasional inaccuracies, lack of real-world experience, and the potential for biased outputs. Therefore, educators and learners should use ChatGPT as a supplementary resource rather than a sole reference.[4]

In the realm of public health, ChatGPT can play a pivotal role in empowering individuals and communities to make informed decisions about their health. It can act as a virtual health advisor, offering guidance on preventive measures, healthy lifestyle choices, and general health information. This can be particularly beneficial in reaching populations with limited access to traditional healthcare resources.[5,6]

To assess ChatGPT's knowledge in preventive and social medicine, it would be essential to evaluate its accuracy and depth of understanding in topics such as epidemiology, health promotion, disease prevention, and social determinants of health. Additionally, addressing any potential biases in the model's responses and ensuring that the information aligns with current medical guidelines is crucial for its reliable application in public health initiative.

Objectives

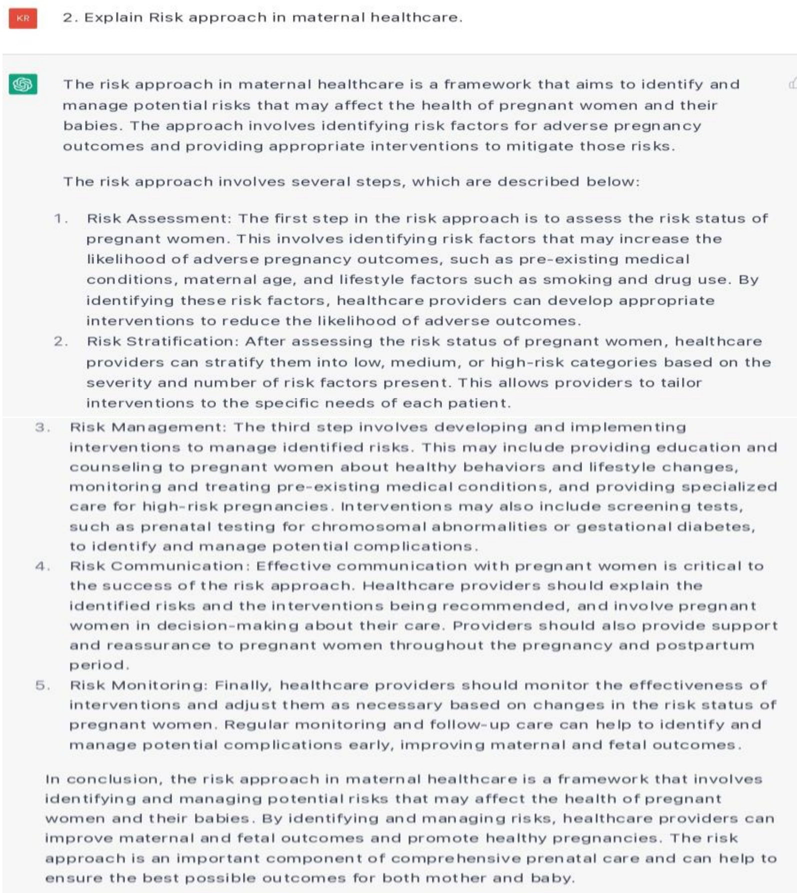
This study aims to assess the knowledge and potential applications of ChatGPT, an advanced AI language model, in the field of preventive and social medicine. The focus is on evaluating the model's proficiency in providing accurate and contextually relevant information related to public health principles. By conducting this assessment, the study aims to determine the feasibility and effectiveness of integrating ChatGPT into medical education and public health initiatives, with the ultimate goal of contributing to the improvement of physical and mental health outcomes for the population.

METHODS

ChatGPT 3.5 was used for this study. Our evaluation used university examination question papers, encompassing both part 1 and part 2 of preventive and social medicine in the third year of the Bachelor of medicine and bachelor of surgery (MBBS) course. The examination included various question types such as essays (2), short notes (10), and multiple-choice questions (MCQs) (20), each scored for a maximum of 15, 10 and 1 respectively. The maximum mark was 100. We typed the questions into ChatGPT and recorded the responses generated without making any alterations. For MCQs, we provided the question and answer choices and saved ChatGPT's answers for evaluation by faculty members from the department of community medicine.

RESULTS

The evaluation results indicate that ChatGPT possesses a solid understanding of preventive and social medicine concepts and performed well in providing detailed and suitable answers to the questions. An example of response generated to risk approach in maternal health is provided in Figure 1. In the case of MCQs, ChatGPT also offered explanations for the chosen answers, which enhanced the educational value of the responses.


KR 2. Explain Risk approach in maternal healthcare.

The risk approach in maternal healthcare is a framework that aims to identify and manage potential risks that may affect the health of pregnant women and their babies. The approach involves identifying risk factors for adverse pregnancy outcomes and providing appropriate interventions to mitigate those risks.

The risk approach involves several steps, which are described below:

1. Risk Assessment: The first step in the risk approach is to assess the risk status of pregnant women. This involves identifying risk factors that may increase the likelihood of adverse pregnancy outcomes, such as pre-existing medical conditions, maternal age, and lifestyle factors such as smoking and drug use. By identifying these risk factors, healthcare providers can develop appropriate interventions to reduce the likelihood of adverse outcomes.
2. Risk Stratification: After assessing the risk status of pregnant women, healthcare providers can stratify them into low, medium, or high-risk categories based on the severity and number of risk factors present. This allows providers to tailor interventions to the specific needs of each patient.
3. Risk Management: The third step involves developing and implementing interventions to manage identified risks. This may include providing education and counseling to pregnant women about healthy behaviors and lifestyle changes, monitoring and treating pre-existing medical conditions, and providing specialized care for high-risk pregnancies. Interventions may also include screening tests, such as prenatal testing for chromosomal abnormalities or gestational diabetes, to identify and manage potential complications.
4. Risk Communication: Effective communication with pregnant women is critical to the success of the risk approach. Healthcare providers should explain the identified risks and the interventions being recommended, and involve pregnant women in decision-making about their care. Providers should also provide support and reassurance to pregnant women throughout the pregnancy and postpartum period.
5. Risk Monitoring: Finally, healthcare providers should monitor the effectiveness of interventions and adjust them as necessary based on changes in the risk status of pregnant women. Regular monitoring and follow-up care can help to identify and manage potential complications early, improving maternal and fetal outcomes.

In conclusion, the risk approach in maternal healthcare is a framework that involves identifying and managing potential risks that may affect the health of pregnant women and their babies. By identifying and managing risks, healthcare providers can improve maternal and fetal outcomes and promote healthy pregnancies. The risk approach is an important component of comprehensive prenatal care and can help to ensure the best possible outcomes for both mother and baby.

Figure 1: ChatGPT response to "risk approach in maternal health" (source: OpenAI. Introducing ChatGPT. https://openai.com/blog/chatgpt).

However, it's worth noting that a few answers lacked completeness according to references in standard textbooks and there was some repetition in content, which might affect the accuracy and comprehensiveness of the information provided. Overall, ChatGPT demonstrated commendable performance, achieving a score of 62% in Paper 1 and 65% in Paper 2. Out of the 20 MCQs in each paper, ChatGPT correctly answered 18 questions in Paper 1 and 14 questions in Paper 2.

DISCUSSION

Our results suggest that ChatGPT possesses a good grasp of the subject matter. However, the scope of this evaluation was limited to a specific set of undergraduate medical exam question papers, and therefore, the findings may not be generalized. To effectively incorporate ChatGPT as a tool to enhance public health, further studies are necessary to validate the accuracy and reliability of generated content and to explore its practical implications. While ChatGPT shows promise in assisting with medical education and public health, several noteworthy drawbacks need to be considered. Despite its capabilities, ChatGPT is not immune to errors or misinformation. The information it provides should be cross-referenced with trusted sources to ensure accuracy, especially in medical and public health contexts where accuracy is critical.[7] ChatGPT may inadvertently violate privacy and ethical principles in healthcare. It may lack the ability to uphold the same ethical standards as human practitioners and might lack cultural sensitivity, which is crucial in public health initiatives.[8] ChatGPT should not replace the role of healthcare professionals, epidemiologists, or public health specialists. It cannot solely diagnose or provide personalized medical advice and may lack the nuance required for complex health issues.[9]

ChatGPT may struggle to understand the unique socio-cultural, economic, and political contexts of different regions and populations. Preventive and social medicine often requires tailoring interventions to specific communities, which ChatGPT may not fully grasp. As observed in our evaluation, ChatGPT occasionally provided repetitive or incomplete answers, which can be frustrating for users seeking comprehensive information.

The utilization of ChatGPT in medical education and public health has promising implications. It could serve as a supplementary tool for students to gain insights and explanations in their study of preventive and social medicine. Moreover, ChatGPT can potentially provide accessible and instant information to the public on various health-related topics, promoting health literacy and informed decision-making. However, caution must be exercised, as the accuracy of the generated content is subject to limitations. The repetition and lack of completeness in some responses raise concerns about the reliability of ChatGPT in certain contexts. As it stands, ChatGPT should be considered a supportive resource rather than a sole authoritative source in medical education and public health.

To harness the full potential of ChatGPT in these domains, future studies should focus on refining its responses, addressing accuracy concerns, and evaluating its effectiveness in real-world educational and healthcare settings. These investigations can help ensure that ChatGPT truly enhances the quality of medical education and positively impacts public health outcomes.

CONCLUSION

The integration of ChatGPT into medical education and public health holds great promise for transforming the way information is disseminated and healthcare decisions are made. However, it is imperative to approach this technology with a vigilant mindset, acknowledging and addressing its limitations. As we aspire to harness the full potential of ChatGPT, future studies should focus on refining the model's responses, ensuring accuracy, and evaluating its practical effectiveness in real-world settings. Through continuous improvement and validation efforts, we can optimize ChatGPT to truly enhance the quality of medical education and positively impact public health outcomes. This iterative process will contribute to the responsible integration of AI technologies, fostering a more informed and healthier society.

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