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ЧАТ-БОТЫ НА ОСНОВЕ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА ДЛЯ СТУДЕНТОВ И ПАЦИЕНТОВ: ПРИМЕНЕНИЕ МЕДИЦИНСКИХ КОНСУЛЬТАЦИОННЫХ ЧАТ-БОТОВ В ОБРАЗОВАНИИ И ЗДРАВООХРАНЕНИИ

Аннотация. *Развитие искусственного интеллекта создает новые возможности для совершенствования медицинского образования и поддержки пациентов с помощью интеллектуальных чат-ботов. Цель статьи — проанализировать основные направления применения, потенциальные преимущества и ограничения чат-ботов на основе искусственного интеллекта для студентов и пациентов. В исследовании применяются описательный и сравнительный анализ научной литературы и международных рекомендаций по этичному использованию искусственного интеллекта в здравоохранении. Анализ выявляет ключевые направления применения, включая персонализированное обучение, доступ к общей информации о здоровье, информирование пациентов и навигацию в системе здравоохранения, а также риски, связанные с точностью информации, конфиденциальностью данных и безопасностью пациентов.*

Ключевые слова: *:* *искусственный интеллект, здравоохранение, медицинское образование, чат-боты, поддержка пациентов, цифровое здравоохранение, защита данных.*

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AI-POWERED CHATBOT SYSTEMS FOR STUDENTS AND PATIENTS: APPLICATIONS OF MEDICAL ADVICE CHATBOTS IN EDUCATION AND HEALTHCARE

Abstract. *The development of artificial intelligence (AI) has created new opportunities for improving medical education and patient support through conversational chatbot systems. This article aims to analyze the main applications, potential benefits, and limitations of AI-powered chatbots for students and patients. The study applies descriptive and comparative analysis of scientific literature and international guidance on the ethical use of AI in healthcare. The analysis identifies key areas of application, including personalized learning, access to general health information, patient education, and healthcare navigation, while highlighting risks related to accuracy, privacy, and patient safety.*

Keywords: *artificial intelligence, healthcare, medical education, chatbots, patient support, digital health, data protection.*

Introduction

The development of digital technologies has significantly influenced the organization of education and healthcare. Artificial intelligence has become an important technological instrument for processing information, supporting communication, and automating selected tasks. Among its practical applications, conversational chatbot systems have attracted attention because they allow users to interact with digital systems through natural language. In medical education, students must understand complex theoretical concepts, acquire professional terminology, and develop the ability to analyze clinical information. Conventional lectures, textbooks, laboratory activities, and supervised clinical training remain essential. However, digital tools can supplement these educational methods by providing additional explanations, practice questions, and interactive learning opportunities.

Materials and Methods

The article uses a descriptive and analytical research approach based on the examination of scientific literature and international guidance concerning artificial intelligence in healthcare [1]. The methodological framework includes two complementary approaches. First, descriptive analysis is used to characterize the main functions of chatbot systems in medical education and patient support. These functions include answering educational questions, generating practice exercises, explaining general health information, and assisting users in navigating healthcare services. Second, comparative analysis is applied to distinguish the requirements of educational chatbots from those of patient-facing systems. Educational applications primarily support learning and knowledge development, whereas patient-facing applications must place particular emphasis on information accuracy, privacy, and the avoidance of inappropriate medical recommendations.

Results and Discussion

AI-powered chatbots can provide supplementary educational support to students studying medicine, nursing, pharmacy, biomedical engineering, and related disciplines. Their conversational interfaces allow students to ask questions in natural language and request explanations adapted to their learning needs. One important application is personalized learning support. Students may ask a chatbot to explain a difficult concept in simpler language, compare related medical terms, or provide examples. For instance, a student studying cardiovascular physiology may request an explanation of the relationship between heart rate, stroke volume, and cardiac output.

Accuracy and Reliability of AI-Generated Information

One of the main limitations of generative AI is its ability to produce fluent responses that may nevertheless be factually incorrect [2]. Such errors can occur when a system lacks relevant information, misinterprets a question, or generates a response without sufficient clinical context. For educational applications, incorrect information may lead to misunderstandings and the development of inaccurate knowledge. In patient-facing applications, the consequences may be more serious if users rely on an inappropriate recommendation.

Privacy and Data Protection

Medical chatbot interactions may involve sensitive personal information, including symptoms, medications, diagnoses, and medical history. Improper handling of such data can create risks for patients and healthcare organizations. Responsible implementation requires data minimization, appropriate access controls, secure data handling, and clear explanations of how user information is collected and processed [1].

Conclusion

AI-powered chatbot systems offer potential opportunities to improve medical education and patient support. In education, they can supplement

traditional teaching through interactive explanations, practice questions, terminology support, and simulated learning scenarios. For patients, they can provide accessible general health information, explain medical terminology, and assist with preparation for healthcare consultations. The analysis demonstrates that the needs of students and patients differ significantly. Educational chatbots should prioritize the accuracy of learning materials and alignment with educational objectives, whereas patient-facing systems require particularly strong safeguards concerning reliability, privacy, and the appropriate use of medical information. Several conditions are essential for responsible implementation: the use of reliable information sources, transparent communication of limitations, protection of personal data, appropriate risk management, and human oversight [3]. Chatbots should not be treated as replacements for qualified educators, physicians, or other healthcare professionals [4]. The conceptual framework presented in this article identifies purpose definition, reliable information, risk management, data protection, and continuous evaluation as key components of responsible implementation. It may be used as a basis for planning future educational and healthcare chatbot applications. Further research should evaluate chatbot accuracy across different medical topics and languages, examine usability among different user groups, and assess the effectiveness of safety mechanisms. Empirical studies are also needed to determine whether these systems produce measurable improvements in student learning, patient understanding, or healthcare navigation.

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