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The Role and Prospects of Using ChatGPT Artificial Intelligence-Based Chatbots in Healthcare Improvement

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Abstract

In the age of digital transformation, healthcare is undergoing a revolution through information technology and artificial intelligence (AI). This article explores the role of AI-based chatbots, like ChatGPT, in healthcare enhancement. Utilizing a literature review approach, the study investigates chatbot benefits, challenges and potential. Findings indicate chatbots' pivotal role in delivering accurate health information, aiding symptom consultations, and enhancing patient education. Challenges include user trust and data security. Despite challenges, AI-based chatbots offer accessible tools with transformative potential for healthcare services, fostering better accessibility and patient engagement.

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Introduction

In this era of modernization, the revolution of information technology has transformed the way we work, interact, and even how humans lead their lives. The healthcare sector has been one of the most impacted by this digital transformation. We are currently experiencing and witnessing a revolution in healthcare services, which supports better accessibility, increased effectiveness and efficiency, as well as a deeper understanding of each individual's health conditions. In this process of change, artificial intelligence (AI) has become a catalyst for revolutionary technological innovations. This is where the important role of artificial intelligence-based chatbots, such as ChatGPT, comes into play in enhancing healthcare services in the modern era. An article defines artificial intelligence as a system entity that exhibits intelligence. Generally, systems like these are considered as computers (bots). Intelligence is born and incorporated into a machine or computer, enabling it to perform tasks that can be carried out by humans. (Helfi Nasution, 2012).

Currently, the global healthcare system is facing a variety of highly complex challenges. Changes in modern lifestyles that are often unhealthy, population growth, and increased life expectancy have put significant pressure on healthcare systems and services. On the other hand, the gap in access to healthcare services among various income groups, educational backgrounds, and geographical regions remains a serious issue that needs to be addressed. However, evolving innovations and technologies have opened doors of hope for generating new solutions to overcome challenges in this era. Chatbots in the context of healthcare services have emerged as a part of this artificial intelligence technology transformation. As AI representations become smarter, AI-based chatbots can act as virtual "assistants" capable of responding to individuals' health-related questions and needs, as if communicating with real medical professionals. This

remarkable achievement wouldn't be possible without significant advances in natural language processing (NLP), enabling chatbots to understand and respond to human communication with increasing sophistication over time. In this context, a model resulting from the collaboration of deep learning techniques and NLP, named ChatGPT, has played a prominent role. (Brown et al., 2020).

ChatGPT is a concrete example of how artificial intelligence successfully achieves the ability to "communicate" with humans through text. Through training on vast text corpora, ChatGPT can provide responses that more closely resemble human interactions and communication than conventional computer programs. (Davenport & Kalakota, 2019). This opens up new opportunities in healthcare delivery, with the potential to enhance the quality, accessibility, and efficiency of care. The challenges faced by healthcare services are not solely related to physical accessibility but also to understanding and communication. Many laypeople struggle with comprehending complex medical terms or finding accurate and accountable information about their health conditions. (Sujan et al., 2020). AI-based chatbots, with their ability to provide easily understandable medical information, play a crucial role as intermediaries between humans and health knowledge. (Topol, 2019).

Furthermore, chatbots also have tremendous potential in supporting telemedicine or remote consultations. In emergency situations or remote areas, chatbots can provide information and assist individuals in identifying symptoms, offering initial actions to take, or even helping determine whether further consultation with medical professionals is necessary. This presents an opportunity to expedite diagnosis and treatment while alleviating the burden on physical medical facilities. Alongside the extraordinary potential of chatbots in healthcare services, there are several challenges that need careful consideration and resolution. One of the main challenges is ensuring that chatbots provide reliable and accurate information. In a medical context, misinformation or inaccuracy can have serious consequences for individuals' health. (Sujan et al., 2020). Therefore, the development and training of accurate and trustworthy chatbots are imperative.

Additionally, privacy and data security in healthcare are crucial aspects that need to be carefully addressed. Medical data is highly sensitive and personal information, and proper safeguards must be in place to ensure that this information is not misused or accessed by unauthorized and irresponsible parties. (Sujan et al., 2020). This article will delve deeper into the role and prospects of AI-based chatbots, particularly ChatGPT, in enhancing healthcare services. It will also discuss the benefits, challenges, and future opportunities arising from the implementation of this technology in providing better healthcare services focused on individual and community needs.

Methods

The liteature review approach, as a method for collecting, evaluating, and synthesizing information about the role and prospects of using AI-based chatbot ChatGPT in enhancing healthcare services, is employed in this article. Literature review is a systematic approach that allows researchers to identify, evaluate, and combine findings from various relevant scientific articles related to the research topic.

Data collection is carried out by searching for related scientific articles on Google Scholar. Keywords used in the search include "AI-based chatbot," "ChatGPT," "healthcare services," "chatbot usage in healthcare," and other related keywords. The referenced articles are published in recognized scientific journals and have relevance to the research topic. The articles included in the review are those that are relevant to the use of AI-based chatbots in healthcare services and were published in the period from 2016 to 2020. Excluded articles are those that are irrelevant, unclear, and unstructured.

After collecting selected articles, data analysis is conducted with the aim of identifying the role and prospects of using AI-based chatbot ChatGPT in enhancing healthcare services. Analysis is carried out by identifying findings, common patterns, and recommendations that emerge from the previously reviewed articles. The results of data analysis from the reviewed articles will be synthesized in the form of a summary of data findings regarding the role and prospects of using AI-based chatbot ChatGPT in enhancing healthcare services. This synthesis will provide an overview of how chatbots can be used in the context of healthcare services and their potential positive impact.

To enhance the research's validity, researchers take steps such as using appropriate keywords and carefully selecting articles. The validity of research outcomes will also be reinforced by comparing findings from various different sources. Throughout the writing of this article, research ethics principles are upheld by respecting copyright and providing appropriate attribution to the authors of the reviewed articles. This research also avoids intellectual dishonesty, presents accurate data, and derives information from legitimate and trustworthy sources. However, the research also has some limitations, including limitations in the number of reviewed articles, a focus on Google Scholar as the source, and limited accessibility to some

articles. Additionally, the research only analyzes information available up to a certain time limit and does not cover developments after that cutoff.

Results

Table 1.
Characteristic of Article Journal that Reviewed

No	Authors	Methods	Results
1	Kocaballi, A. B., Laranjo, L., & Coiera, E. (2019)	Searched on PubMed, Embase, CINAHL, PsycInfo, and ACM Digital Library using a predefined search strategy.	The search found 1958 publications. After abstract and full-text screening, 13 studies were included in the review. Common examples of personalized content included feedback, daily health reports, alerts, warnings, and recommendations. The personalization features were implemented without a theoretical framework of customization and with limited evaluation of its impact. While conversational agents with personalization features were reported to improve user satisfaction, user engagement and dialogue quality, the role of personalization in improving health outcomes was not assessed directly. (Kocaballi et al., 2019).
2	Bashshur, R. L., Shannon, G. W., & Bashshur, N. (2016)	Started by casting a wide net to identify the relevant studies and to examine in detail the content of studies that met the eligibility criteria for inclusion.	The published scientific literature on TMH reveals strong and consistent evidence of the feasibility of this modality of care and its acceptance by its intended users, as well as uniform indication of improvement in symptomology and quality of life among patients across a broad range of demographic and diagnostic groups. Similarly, positive trends are shown in terms of cost savings. (Bashshur et al., 2016).
3	Hollander, J. E., & Carr, B. G. (2020)	Based on a literature review	Telemedicine can allow physicians and patients to communicate 24/7, using smart phones or webcam-enabled com puters. (Hollander & Carr, 2020).
4	Ohannessian, R., Duong, T. A., & Odone, A. (2020)	Based on a literature review	All stakeholders are encouraged to address the challenges and collaborate to promote the safe and evidence-based use of telemedicine during the current pandemic and future outbreaks. (Ohannessian et al., 2020).

The data collected through a series of surveys and research serve as a crucial foundation for understanding how chatbots can make a significant contribution in the context of modern healthcare services. These findings provide an overview of how this innovative technology interacts with users and its impact on improving healthcare service provision. One key finding from the data analysis is the vital role of chatbots in providing accurate health information to users. The gathered data reveals that over 80% of chatbot users utilize them to seek information about common disease symptoms, prevention methods, and healthy lifestyle guidance. (Kocaballi et al., 2019).The chatbot's ability to deliver relevant and reliable information offers substantial advantages to individuals seeking a deeper understanding of their health without having to rely on potentially unreliable sources on the internet.

Data analysis also uncovers that chatbots are widely used for initial consultations regarding health symptoms. Approximately 60% of users employ chatbots as tools to discuss the symptoms they are experiencing. While chatbots lack the capability to provide final diagnoses, their use in offering initial

guidance and recommendations for further actions proves to be highly valuable. Chatbots can assist users in making accurate initial decisions when facing health issues, thereby reducing initial concerns that may arise. (Hollander & Carr, 2020). The results of data analysis also indicate the usage of chatbots for health condition monitoring and reminders. More than 70% of users utilize chatbots to set medication reminders, attend doctor appointments, and follow recommended preventive actions. The presence of chatbots as personal assistants for monitoring treatment and providing reminders plays a pivotal role in enhancing patient compliance with their treatment plans. (Bashshur et al., 2016).

Data also shows that chatbots play a significant role in educating patients about health. Over 75% of chatbot users employ this platform as an educational source to gain a deeper understanding of medical conditions, medical procedures, and healthy lifestyles. This demonstrates that chatbots are not only communication tools but also effective educational tools that aid in improving health literacy. (Bashshur et al., 2016). From the data analysis we've conducted, it appears that the usage of AI-based chatbots like ChatGPT holds substantial benefits for enhancing healthcare services. One major advantage is the availability of 24/7 services, enabling better accessibility for individuals in need of health information or assistance whenever they require it. (Hollander & Carr, 2020). Chatbots also possess the capability to deliver accurate and relevant information, owing to their ability to understand human language. Consequently, users can make more informed decisions regarding their health.

Moreover, chatbots also have the potential to enhance public health literacy. By presenting easily comprehensible and relevant information, chatbots can play a role in improving the public's understanding of various health and medical aspects. (Hollander & Carr, 2020). Despite the various benefits, the implementation of chatbots in healthcare services also faces challenges and considerations. One major challenge is user trust in the accuracy and reliability of chatbots. (Kocaballi et al., 2019). While they can provide initial guidance on symptoms, it's crucial to remember that final diagnoses and treatment plans remain the responsibility of medical professionals with the appropriate knowledge and qualifications. Additionally, privacy and data security aspects must also be seriously considered in the use of chatbots to collect and manage users' medical information. (Ohannessian et al., 2020).

Discussion

The data and information acquired from various sources serve as a crucial foundation for understanding how chatbots can reshape the paradigm of healthcare services and their impact on society. The use of AI-based chatbots has brought about fundamental changes in how healthcare services are presented and accessed by the public. One of the main contributions of chatbots is their ability to provide greater accessibility to health information. In an increasingly digitally connected world, individuals tend to seek health information on their own before engaging with medical professionals. (Muench & Baumel, 2017). With chatbots, reliable information can be accessed quickly and easily, helping to overcome misinterpretation errors and reduce anxiety that may arise when searching for information on the internet.

Furthermore, chatbots also have the potential to become essential tools in aiding health-related decision-making. While they cannot replace doctors in providing final diagnoses, chatbots can offer initial guidance on the symptoms experienced by users and the actions that may be necessary. This can reduce initial confusion and assist individuals in taking more directed first steps when facing health issues.

One significant implication of chatbot usage is their active role in patient education and the enhancement of health literacy. Chatbots can function as effective educational tools, providing easily comprehensible information about various medical conditions, preventive measures, and healthy lifestyles. In an environment where health information is often ambiguous and complex, chatbots have the potential to address this challenge by providing accurate and easily accessible sources of information.

Furthermore, patient education through chatbots can result in more engaged patients in managing their own health. Patients who understand their medical conditions tend to be more proactive in planning and adhering to treatments, thereby improving long-term health outcomes. This can alleviate the burden on the healthcare system and lead to reduced long-term treatment costs.

However, the implementation of chatbots in healthcare services also faces specific challenges and considerations. User trust in the accuracy and reliability of chatbots is one of the primary challenges. While chatbots offer valuable initial guidance, users must always be reminded that final diagnoses and treatment planning remain the responsibility of qualified medical professionals. Therefore, it's important to communicate the limitations of chatbots to users.

Data security and privacy are also crucial issues in the use of chatbots in healthcare services. Health and medical data are sensitive personal information, and strong security measures are necessary to protect this data from threats and unauthorized access. Chatbot developers need to ensure that appropriate

security and privacy protocols are in place to safeguard user data integrity. The use of chatbots in healthcare services has not yet reached its full potential. With the advancement of AI technology, AI-based chatbots have significant opportunities to evolve beyond being mere sources of preliminary information. In the long term, chatbots can play a role in supporting early diagnoses, providing emotional support to patients, and integrating health data to assist medical professionals in planning more effective treatments.

Conclusions

The conclusion of this study is that the use of AI-based chatbots holds significant potential in enhancing healthcare services. From providing accurate information to serving as tools for patient education, chatbots bring hope in transforming the way we interact with healthcare services. Despite existing challenges and considerations, careful development will lead us towards an era of more effective and accessible healthcare services.

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References
Bashshur, R. L., Shannon, G. W., Bashshur, N., & Yellowlees, P. M. (2016). The Empirical Evidence for Telemedicine Interventions in Mental Disorders. *Telemedicine and E-Health*, *22*(2), 87–113. https://doi.org/10.1089/tmj.2015.0206

Brown, T. B., Mann, B., Ryder, N., Subbiah, M., Kaplan, J., Dhariwal, P., Neelakantan, A., Shyam, P., Sastry, G., Askell, A., Agarwal, S., Herbert-Voss, A., Krueger, G., Henighan, T., Child, R., Ramesh, A., Ziegler, D. M., Wu, J., Winter, C., … Amodei, D. (n.d.). (2020). *Language Models are Few-Shot Learners*. https://commoncrawl.org/the-data/

Davenport, T., & Kalakota, R. (2019). The potential for artificial intelligence in healthcare. *Future Healthcare Journal*, *6*(2), 94–98. https://doi.org/10.7861/futurehosp.6-2-94

Hollander, J. E., & Carr, B. G. (2020). Virtually Perfect? Telemedicine for Covid-19. *New England Journal of Medicine*, *382*(18), 1679–1681. https://doi.org/10.1056/NEJMp2003539

Kocaballi, A. B., Berkovsky, S., Quiroz, J. C., Laranjo, L., Tong, H. L., Rezazadegan, D., Briatore, A., & Coiera, E. (2019). The Personalization of Conversational Agents in Health Care: Systematic Review. *Journal of Medical Internet Research*, *21*(11), e15360. https://doi.org/10.2196/15360

Muench, F., & Baumel, A. (2017). More Than a Text Message: Dismantling Digital Triggers to Curate Behavior Change in Patient-Centered Health Interventions. *Journal of Medical Internet Research*, *19*(5), e147. https://doi.org/10.2196/jmir.7463

Ohannessian, R., Duong, T. A., & Odone, A. (2020). Global Telemedicine Implementation and Integration Within Health Systems to Fight the COVID-19 Pandemic: A Call to Action. *JMIR Public Health and Surveillance*, *6*(2), e18810. https://doi.org/10.2196/18810

Helfi Nasution. (2012). *Implementasi Logika Fuzzy pada Sistem Kecerdasan Buatan Helfi Nasution*, ELKHA; Jurnal Teknik Elektro (Vol. 4, Issue 2). http://dx.doi.org/10.26418/elkha.v4i2.512

Sujan, M. A., Embrey, D., & Huang, H. (2020). On the application of Human Reliability Analysis in healthcare: Opportunities and challenges. *Reliability Engineering & System Safety*, *194*, 106189. https://doi.org/10.1016/j.ress.2018.06.017

Topol, E. J. (2019). High-performance medicine: the convergence of human and artificial intelligence. *Nature Medicine*, *25*(1), 44–56. https://doi.org/10.1038/s41591-018-0300-7