



## Review Article

# An Overview of the Evolution and Impact of Chatbots in Modern Healthcare Services

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## ABSTRACT

Over the past few decades, healthcare sector has developed along parallel paths with trendy technology. Modern practices of artificial intelligence strategies have led to improved diagnosis, the development of effective treatments, telemedicine, and the development of patient monitoring devices. Many applications have emerged that help doctors and healthcare workers, most notably Chatbot. It is a program that utilises artificial intelligence techniques to conduct conversations in real-time. This program is able to simulate that you are a natural person writing or talking to another Internet user, which is the application. This article discusses the matter of Chatbot technology in developing electronic healthcare services and helping patients communicate electronically to obtain information that supports them in improving their health condition.

## 1. INTRODUCTION

Recently, the demand for electronic healthcare services has increased due to the comfort of dealing with them and the quality of services provided to patients [1][2]. These services are a model for transforming the healthcare industry into electronic services that rely on modern technology and information to facilitate communication and simplify processes between patients and healthcare workers. E-health is a modern electronic system that relies heavily on the evolution of technology and artificial intelligence in its work [3][4]. It includes tools for storing patient and medication data and information and managing them securely. Furthermore, it has electronic health records (EHRs), telemedicine platforms, mobile health apps, and many other digital tools designed to improve patient care and provide appropriate services to them. The development of hospital and medical clinic systems has led to improved diagnosis and timely treatment. The healthcare sector works in parallel with technology and artificial intelligence techniques [5-7]. This development has significantly improved the healthcare environment and increased the number of electronic services provided to patients. Artificial intelligence is a branch of computer science and one of the most noteworthy topics discussed in the recent period, especially after the emergence of applications that simulate the human mind, such as ChatGPT [8-10]. It includes concepts related to logic and learning and consists of algorithms trained on databases, which can be formed from collected images or different types of signals. This science is described as the field that deals with intelligent computational behaviour by designing computer tools that simulate human intelligence processes that include learning, reasoning, and self-correction [11-13]. Therefore, computers are able to create specific decisions based on general rules that depend on training according to the environment in which they live.

The most significant advantage of electronic healthcare is its remarkable ability to create a secure central repository that includes patient data that healthcare workers and physicians can access [14][15]. Electronic health records allow healthcare workers to access patient data and view the patient's medical history, diagnoses, medications, and treatment plans in real-time with complete accuracy and comfort [16][17]. Telemedicine is one of the most critical services provided by electronic healthcare on a large scale, as it allows for remote consultations and monitoring, overcoming geographic barriers, enhancing communication with patients, and enhancing their health condition [18-20]. These benefits are developments thanks to

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artificial intelligence techniques that contribute to building a virtual environment that supports humans in accomplishing many assignments [21][22]. The advancement of artificial intelligence applied in medicine is imminent; Scientific publications on integrating artificial intelligence technologies into healthcare have increased significantly due to the importance of this topic and its remarkable development. Artificial intelligence practices are predicted to penetrate work environments in the health sector, such as hospitals, laboratories, clinics, etc., in the coming years [23][24]. One area that artificial intelligence concentrates on is imaging, which deals with processing and interpreting images for diagnosis. These techniques improve the quality and accuracy of diagnosis, and their methods are excellent for automatically recognizing complex patterns in images, eliminating noise and allowing the creation of 3D models from images of specific tissues. As technology continues to advance, the continuous integration of electronic healthcare solutions holds the promise of improving healthcare workflow, improving patient outcomes, and contributing to the overall efficiency and effectiveness of modern healthcare systems. Figure 1 shows artificial intelligence techniques in diagnosing X-ray images. This article reviews the significance and impact of chatbot technology in healthcare services. Also, it gives a perspective on how this technology continues to impact medicine in the 21<sup>st</sup> century.

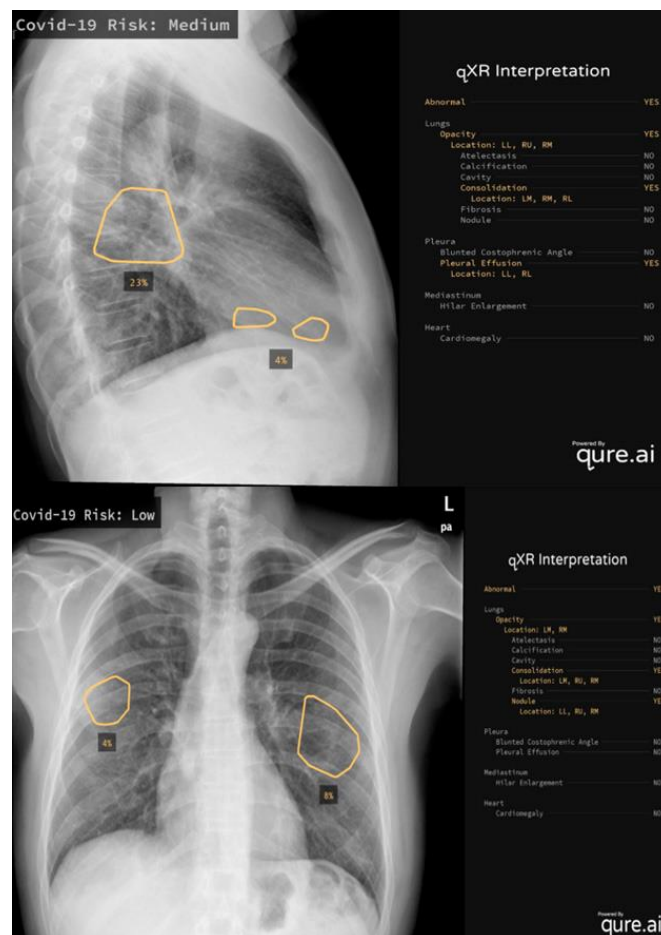


Fig. 1. Artificial intelligence techniques in diagnosing X-ray images [25].

## 2. CHATBOT TECHNOLOGY

Chatbot technology has appeared as a vital tool that contributes to the growth of the healthcare environment [26][27]. This tool plays a crucial role in designing electronic medical services and increasing the efficiency of healthcare workers. Chatbots allow immediate interaction between patients and physicians with high accuracy by providing a safe environment within hospital and medical clinic systems [28-30]. This technology provides basic information about symptoms, medications, and medical appointments, as well as contributes to patient education and training healthcare workers on strategies for dealing with patients. This technology has a significant role in making the right decisions and determining the type of disease. Moreover, Chatbots can achieve a virtual disease classification, prioritize cases based on severity, and assist patients in communicating with healthcare workers with straightforward, simple procedures and without any

restrictions. This technology enhances the resources of hospitals and clinics, reduces the burden on healthcare workers, and trains them in the most complex medical cases that require excellent skills in saving patients' lives. Health institutions seek to employ artificial intelligence technologies in developing hospitals, manufacturing medicines, tracking patients, assigning medications, and reminding them of appointments. Chatbots can do these things and more, as they are scalable tools for serving patients and growing healthcare workers. The main purpose of this technology is to understand patients' needs and respond to them. Figure 2 illustrates the design of a framework for human interaction with Chatbot technology.

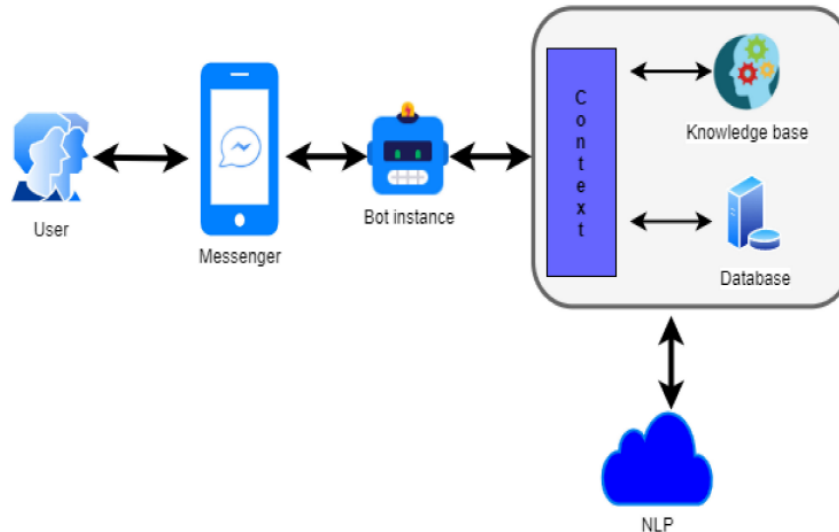


Fig. 2. Framework for human interaction with Chatbot technology [25].

Executing chatbots in healthcare not only leads to operational improvements but also significantly impacts the patient's experience and assists physicians in making the proper decisions. The availability of these virtual assistants in the healthcare environment 24/7 allows patients to search for information and clarify doubts at any time, reducing anxiety associated with uncertainty about medical issues. Moreover, the interactive nature of chatbots facilitates patients' active participation in managing their health, encouraging them to take preventive measures and adopt a forceful approach towards well-being. In environments where the burden of care can outstrip health workers, chatbots become practical supporters to ensure faster and more effective care. Virtual classification can assist in identifying emergencies and direct patients appropriately, even in situations where immediate intervention is required. This rapid response capability can make the difference between early intervention and disease progression. The implementation of chatbots in healthcare also contributes to administrative efficiency. Automates routine tasks, such as scheduling appointments and managing medical records, freeing up time for medical staff to concentrate on more complex direct care tasks. This not only improves productivity but can also reduce operating costs. However, it is necessary to address the ethical and legal challenges associated with the use of chatbot scenarios in healthcare. Transparency in data collection and benefit, as well as ensuring equitable access to these tools, are critical elements for successful and ethical implementation. The detailed integration of chatbots into healthcare can radically transform service delivery, providing tangible advantages to both healthcare providers and patients. However, it is necessary to address all ethical and privacy concerns associated with executing chatbots in healthcare, ensuring that data collection and processing meets the highest standards of security and confidentiality and that unauthorized persons are not allowed into healthcare systems. Chatbots represent a revolutionary tool in healthcare, offering significant benefits in terms of accessibility, efficiency, and quality, as well as promoting a more patient-centric experience.

### 3. CONCLUSION

Artificial intelligence has dramatically advanced the development of many sectors, including healthcare, where it has been integrated into diagnosing diseases and developing medicines and vaccines. Artificial Intelligence is a practical tool in the healthcare sector whose improvement and use has accelerated in recent decades. Imaging is an important field in the healthcare sector that has been significantly advanced by artificial intelligence techniques. However, executing these techniques remains challenging in several aspects, one of which is that radiologists still need to familiarize themselves with these systems. The application of Chatbot technology is of great importance in educating patients and helping them improve their health condition. This technology is constantly developing, as many applications and platforms, such as ChatGPT, have emerged that support people in developing their skills. AI techniques can be an excellent tool for radiologists.

Collaboration will significantly reduce the time needed to read and interpret images, obtain effective diagnoses, and provide quality patient care.

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## Conflicts of Interest

The author's disclosure statement confirms the absence of any conflicts of interest.

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