

A Qualitative Perspective of Exploring the Role of Generative AI in Transforming Healthcare Systems

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ABSTRACT

The rapid evolution of Generative Artificial Intelligence (GenAI) is significantly reshaping healthcare systems by enhancing clinical decision-making, optimizing operational efficiency, and enabling personalized patient care. This study adopts a qualitative approach to explore the transformative role of GenAI within healthcare settings, focusing on its applications, opportunities, and associated challenges. Data were collected through semi-structured interviews with healthcare professionals, technology experts, and policy stakeholders, along with thematic analysis of relevant case studies and institutional reports.

The findings reveal that GenAI facilitates improved diagnostic accuracy, predictive analytics, medical imaging interpretation, and automated clinical documentation. It also supports patient engagement through virtual assistants and tailored treatment plans. However, the integration of GenAI raises critical concerns related to data privacy, ethical considerations, algorithmic bias, and regulatory compliance. Participants emphasized the need for robust governance frameworks, interdisciplinary collaboration, and continuous monitoring to ensure responsible and equitable deployment.

Furthermore, the study highlights the evolving role of healthcare professionals, who must adapt to AI-augmented environments by developing digital competencies and critical oversight skills. While GenAI presents immense potential to revolutionize healthcare delivery, its successful implementation depends on balancing technological innovation with ethical accountability and human-centered care.

Keywords: Generative Artificial Intelligence, Healthcare Systems, Qualitative Research, Clinical Decision-Making, Digital Health, Ethical Challenges, Health Informatics, AI in Healthcare

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1.1 Background of the Study

The swift development of Artificial Intelligence (AI) has made a huge change in various industries, and the healthcare field has become one of the most affected ones. In the past, AI in healthcare has developed to include more advanced machine learning and deep learning systems that can process complex clinical data compared to the rule-based expert systems. The initial applications were more on diagnostic assistance, predictive analytics, and clinical decision-making systems, which proved to be more accurate and efficient (Jiang et al., 2017; Yu et al., 2018). As time goes by, the adoption of AI technologies has allowed healthcare systems to evolve into data-driven and evidence-based care, improving patient outcomes and operational performance (Aung et al., 2021).

Generative Artificial Intelligence has become a new paradigm in the field in the years of recent years. Generative AI systems can produce new data, such as text, images, and simulations, unlike traditional AI models, which mostly analyze and predict the results. Large Language Models (LLMs), Generative Adversarial Networks (GANs), and transformer-based models have increased the AI application in the healthcare sector because they allow automated clinical records, medical imaging generation, drug discovery, and even communication with patients through chatbots (Reddy, 2024; Sai et al., 2024; Moulaei et al., 2024). Such innovations have brought in new areas to enhance the efficiency, personalization, and scalability of the healthcare delivery systems.

At the same time, the ever-growing demand of the healthcare sector is undergoing a digital transformation as the number of patients, limited resources, and the complexity of modern medical care increase. The traditional healthcare systems are usually faced with inefficiencies, imbalanced data handling, and a lack of interoperability amongst the systems. Generative AI has the potential to address these issues with a viable solution by facilitating the smooth integration of data, performing routine tasks automatically, and improving clinical decision-making (Bhuyan et al., 2025; Pattnaik, 2025). In turn, generative AI is not merely transforming the technological possibilities; it is also changing the structural and functional dynamics of healthcare systems.

1.2 Problem Statement

Even though AI technologies are promising, healthcare systems across the world are still struggling with major operational and structural problems. Among the main challenges, it is the mounting pressure on medical staff members due to a rise in the number of patients and the lack of qualified medical workers. A huge share of the time of clinicians is devoted to administrative burdens due to the documentation, billing, and compliance requirements, thus eliminating their ability to devote attention to patient care (Reddy et al., 2018; Alowais et al., 2023). Also, diagnostic and treatment delays are still common because the processes of data processing and clinical work are not very productive.

The other important issue is the lack of integration of healthcare data in different systems and platforms. Electronic health records, imaging, and laboratory

A Qualitative Perspective of Exploring the Role of Generative AI in Transforming Healthcare Systems

databases typically exist in silos, making information about patients less accessible and usable. Such a fragmentation prevents smooth decision-making and undermines the continuity of care. Even though AI technologies have also been implemented in order to help solve these problems, they are still quite inconsistent and not integrated on the system level (Li et al., 2024).

Although generative AI has shown great promise in dealing with these issues, it has a significant knowledge gap on the overall implications of the technology on healthcare systems. The literature of research available is largely devoted to technical potential, quantitative indicators of performance, and particular uses. Nonetheless, the qualitative investigation of the effects of generative AI on the organization structure, stakeholder experiences, and system-wide transformation is sparse. Such a deficiency of a qualitative understanding does not allow for gaining a full picture of the practical implications of generative AI use in healthcare environments (Moulaei et al., 2024; Ghebrehiwet et al., 2024). Thus, the research on the topic of generative AI transforming the healthcare systems comprehensively and experientially is crucial.

1.3 Research Aim

The main objective of the research will be to discuss how generative artificial intelligence can revolutionize healthcare systems qualitatively. The study aims to investigate the effects of generative AI technologies on clinical practice, administrative procedures, and organizations in health care facilities. The study will offer more insight into the transformative nature of generative AI that goes beyond its technical capabilities by examining the experiences of stakeholders and changes at the system level.

1.4 Significance of the Study

This research has an important role in the evolution of healthcare informatics, as it adds to the list of existing accumulated knowledge on generative artificial intelligence. Although prior research has focused mainly on technological improvement and the statistical results, the proposed study is qualitative to investigate the experiential and systemic aspects of AI implementation. This way would allow gaining a better insight into the impact of generative AI on healthcare delivery, organizational processes, and patient interactions (Sai et al., 2024; Zhang and Boulos, 2023). Practically, the results of the study can be helpful to healthcare policymakers and administrators. Since AI-driven solutions are on the rise across healthcare systems, an informed decision-making approach

regarding the implementation strategies, resource allocation, and governance structures is needed. The study will provide recommendations on the effective implementation of generative AI into current systems and the possible issues that may arise concerning the aspects of ethics, trust, and interoperability (Reddy, 2024; Bhuyan et al., 2025).

Moreover, the research has significant future implications for AI-based healthcare systems. The research offers insights into the development of a sustainable and responsible AI implementation process by outlining the major opportunities and issues related to the use of generative AI. It also emphasizes the necessity of control mechanisms and ethical standards to be used in order to make sure that the utilization of AI technologies in healthcare is safe and fair. This research will provide long-term predictions in favor of more efficient, patient-centered, and technologically advanced healthcare systems.

1.5 Literature Review

1.5.1 Artificial Intelligence in Healthcare Overview.

Jiang et al. (2017) emphasize that the history of artificial intelligence development in the healthcare sector has shifted away to more sophisticated data-driven models that can assist in making clinical decisions. The first AI uses were mostly related to diagnostic support and predictive analytics, which allowed medical workers to be more accurate and efficient in the detection of the disease. The introduction of computational intelligence to medical systems has been the basis of AI-driven advances in the healthcare field in the present day.

Yu, Beam, and Kohane (2018) highlight the importance of machine learning and deep learning in revolutionizing healthcare practices. Pattern recognition in large datasets can be done using machine learning algorithms, and deep learning models, and especially neural networks, have shown impressive potential in medical imaging, genomics, and treatment planning on a personalized basis. Such advancements have made a great enhancement in the accuracy of the diagnosis and allowed the creation of smart health systems.

1.5.2 Generative AI Technologies

According to Reddy (2024), Large Language Models (LLMs) are a major innovation in generative AI that allows machines to write in a human style and support clinical documentation, communicating with patients, and decision-making. These models take advantage of large data sets and transformer networks to interpret

A Qualitative Perspective of Exploring the Role of Generative AI in Transforming Healthcare Systems

and generate contextually aware information to improve efficiency in healthcare processes.

Moulaei et al. (2024) mention the Generative Adversarial Networks (GANs) as a strong method of producing synthetic medical data, especially medical imaging and simulation. GANs are two rival neural networks that complement one another, which enables to generate realistic data that can be used in training and testing medical models without the need to violate patient privacy.

Sai et al. (2024) also mention the importance of transformer-based architectures in developing generative AI technologies. These architectures allow processing sequential data efficiently, and they have become the backbone of the state-of-the-art AI systems, such as LLMs. Their capacity to get long-range dependencies has boosted their use in clinical text analysis and automated reporting.

Chirumavilla (2025) examines the application of AI-powered clinical assistants, which are AI-based applications that aid medical practitioners in decision-making in real-time. Such assistants may be used to automate common tasks, make clinical suggestions, and increase the level of interaction between the assistant and the patient, as well as decreasing the workload required and improving the delivery of services.

1.5.3 Generative AI in Healthcare Applications.

Bhuyan et al. (2025) list clinical documentation automation among the most significant uses of generative AI. Generative AI can alleviate the administrative burden of automating medical records, discharge summaries, and patient notes to give healthcare professionals more time to work with patients.

The authors Zhang and Boulos (2023) write about the use of generative AI in medical imaging, as examples of the latter show that AI models can produce high-quality synthetic images and help to diagnose a disease. These technologies improve the accuracy of the diagnosis and assist the radiologists with the identification of complicated medical conditions.

Ghebrehiwet et al. (2024) provide the importance of the use of generative AI in drug discovery and precision medicine. Through analysis of large datasets and the creation of possible molecular structures, AI facilitates the creation of new drugs and allows the creation of individualized treatment options to treat particular patients.

Alowais et al. (2023) emphasize the application of generative AI in patient communication and virtual assistants, which can ensure constant contact with the

patient and remote medical care. These systems enhance access and make available timely medical information to the patients.

Li et al. (2024) explore the clinical decision support systems that operate on the basis of AI that can help healthcare experts diagnose a disease and suggest treatment options. Examples of such systems include the integration of patient information and medical expertise to improve decision-making.

1.5.4 Generative AI and Healthcare System Transformation

According to Pattnaik (2025), generative AI helps to optimise various workflows by eliminating repetitive jobs and simplifying clinical and administrative workflows. This results in better efficiency in operations and less workload for the healthcare professionals.

According to Reddy, Fox, and Purohit (2018), AI is relevant to cost reduction and enhancing efficiency within the healthcare systems. AI reduces resource wastage and improves service delivery by automating processes and increasing decision-making.

Aung, Wong, and Ting (2021) stress that generative AI can improve patient-centered care by providing individual treatment and enhancing interaction with the patient. Artificial intelligence-based systems will be able to provide personalized healthcare services, which leads to better patient satisfaction and results.

Xie, Zhai, and Lu (2025) address the general implications of AI in the context of healthcare digital transformation, stating that AI technologies are transforming the infrastructure of healthcare and allow shifting towards data-driven and technology-enabled healthcare.

1.5.5. Ethical, Legal, and Governance Issues.

In their study on the use of generative AI in healthcare, Zhang and Boulos (2023) point to the concern of data privacy and security as one of the critical factors of the technology. Sensitive patient data should be used, which increases the threats of data breach and unauthorized access, and requires strong security frameworks.

Mohajer-Bastami et al. (2025) present the problem of bias and fairness in artificial intelligence, stating that unequal training data may result in unequal healthcare. Fairness in AI models is the key aspect in the ethical delivery of healthcare.

Kaul, Enslin, and Gross (2020) point out the need to have accountability and transparency in AI systems. With the increased inclusion of AI in healthcare, it is necessary to develop a better understanding of what AI

A Qualitative Perspective of Exploring the Role of Generative AI in Transforming Healthcare Systems

should be responsible for and make sure that the decisions made by AI can be explained and trusted.

1.5.6 Generative AI Adoption Problems.

According to Reddy (2018), trust and reliability should be listed among the issues in the adoption of AI because healthcare workers might not be ready to depend on AI-based systems unless these systems are properly validated and transparent.

Aung et al. (2021) pinpoint the integration with legacy healthcare systems as one of the major obstacles because the current infrastructures might be unsuitable for the advanced AI technologies, which creates difficulties in implementing them.

According to Li et al. (2024), one of the challenges in healthcare is the skill gap between healthcare professionals, who need to be trained and educated to use AI tools in clinical practice.

1.5.7 Research Gap

Moulaei et al. (2024) note that the gap in the body of literature related to the absence of qualitative research investigating the experiences of stakeholders using generative AI in healthcare is substantial. The majority of the current research is concentrated on quantitative measures of performance as opposed to human and organizational views.

Ghebrehiwet et al. (2024) also highlight the lack of system-level studies exploring the way in which generative AI changes the structure and processes of healthcare. The extensive research that combines technological, organizational, and social aspects of the issue is necessary to gain a complete understanding of the influence of generative AI.

2. Theoretical Framework

A variety of theoretical lenses form the foundation of the study as it strives to gain a thorough insight into the adoption and the effect of generative artificial intelligence on healthcare systems. The phenomenon is associated with technological innovation, human interaction, and organizational transformation, which is why it has to be approached using several frameworks.

The Technology Acceptance Model (TAM) is a model used to explain how health professionals embrace the use of generative AI tools based on two major determinants, which are perceived usefulness and perceived ease of use. Generative AI systems in a healthcare setting, including automated clinical documentation systems and AI-assistants, are more likely to be adopted when the users of these systems feel that they will enhance their efficiency, lessen their administrative burden, and improve their clinical decision-making. When a system is complex, ease of

use is the key factor that is essential under high-pressure clinical conditions, as it can be difficult to adopt the system. Therefore, the TAM can be used to explain the user acceptance behavior and the possibility of incorporating generative AI into the regular healthcare routine.

The Diffusion of Innovation Theory (DOI) helps understand the diffusion of the use of generative AI technologies in healthcare organizations. Adoption is considered a progressive process that goes through levels which include awareness, interest, evaluation, trial, and implementation. Relative advantage, compatibility with existing systems, complexity, trialability, and observability are some of the factors that determine the rate of adoption. Adoption in the healthcare setting is usually slow and reluctant, particularly when risk and regulation remain prominent issues. DOI can help analyze how the innovations of generative AI are transferred to pilot projects and scale-wide implementation in institutions.

According to the Sociotechnical Systems Theory, there exists an interdependency between the technological systems and human elements in an organization. The healthcare system is a complex environment, and effective implementation of generative AI does not hinge only on the efficiency of technologies but also on compatibility with the human workflow, professional activities, and organizational culture. With the development of generative AI, the trend of communication and the way decisions are made can change, as well as the process of work. What is emphasized by this theory is the significance of striking a balance between technical innovation and social acceptance to allow sustainable adoption.

The Digital Transformation Framework in Healthcare offers a macro-level explanation of the role of generative AI in creating systemic change. It deals with the ways in which digital technologies can facilitate the process of moving towards more integrated, data-driven, and patient-centered systems of healthcare. Generative AI is essential in the process of automation, better interoperability of data, and service delivery. This framework can be used to comprehend the ways of how AI can lead to organizational changes, enhance efficiency, and even assist healthcare systems in innovation.

3. Research Methodology

The research methodology explains the systematic procedure applied in the study of how generative AI changes the healthcare system. Since the study is exploratory and aims at learning about the perceptions

A Qualitative Perspective of Exploring the Role of Generative AI in Transforming Healthcare Systems

and experiences, a qualitative methodology will be applied.

3.1 Research Design

The research design used in this study is a qualitative exploratory research design that researches the new role of generative AI in healthcare. This will be a suitable design since it will enable a descriptive examination of the intricate and dynamic phenomena that cannot be sufficiently represented using quantitative approaches. The use of generative AI in the healthcare sector is in its infancy, and its consequences are not clearly understood. As such, an exploratory design will allow the researcher to get deep, in-depth information on the experience and perception of these technologies by various stakeholders.

3.2 Research Approach

This study is based on an interpretivist or constructivist approach. This methodology is founded on the belief that reality is a construction and that people will differently perceive technological changes depending on their experiences and situations. Stakeholders in healthcare, including doctors, nurses, administrators, and IT experts, might hold different opinions about generative AI. The interpretivist method enables the researcher to elicit these subjective perceptions and form a more profound conception of the way meaning is made with regard to AI uptake and application.

3.3 Data Collection Methods

Various qualitative data collection techniques are employed in the study in a bid to guarantee proper and sound results.

Healthcare professionals are interviewed in semi-structured interviews to receive profound information about their experiences with generative AI. This approach is flexible as participants are free to give their opinions, and in the process, major issues are addressed.

The use of focus group discussions brings about the capture of shared experiences and group interactions. Such discussions can be used to comprehend shared perceptions, consensus, or dissent of the participants and social forces shaping the use of AI.

Document analysis implies the examination of policy documents, the reports of the organization, and existing literature on the use of AI in healthcare systems. This technique assists in the interpretation of institutional activities and gives a background to primary information.

Hospital case studies of the application of generative AI can provide practical knowledge of what can be done in practice. Such case studies are useful in

determining the best practices, problems, and results related to the integration of AI.

3.4 Sampling Strategy

The researcher embraces purposive sampling to find the research subjects who have first-hand experience in the use of generative AI in healthcare. This makes the data gathered relevant and information-rich. Moreover, snowball sampling is applied to find out additional participants on the basis of references, particularly in a specific area where the number of experts is small.

These participants are doctors, nurses, healthcare administrators, and IT specialists, so as to have a broad range of views on the adoption of AI and its effects.

Table: Sampling Framework

Participant Group	Role in Healthcare System	Relevance to Study
Doctors	Clinical decision-making	Use of AI in diagnosis and treatment
Nurses	Patient care delivery	Interaction with AI tools in daily workflow
Administrators	Policy and management	Implementation and governance of AI systems
IT Specialists	Technical support	Integration and maintenance of AI technologies

3.5 Data Analysis Method

Thematic analysis is used in the study to examine the qualitative data. This approach will entail the systematic identification, arrangement, and interpretation of patterns or themes in the data. The process starts with familiarization of the data, coding, theme generation, and interpretation.

Thematic analysis is quite appropriate to be used in this study because it is flexible to examine data, which might be collected through various sources, such as interviews, focus groups, and documents. It assists in finding crucial themes associated with the adoption of generative AI, system transformation, challenges, and the perceptions of the stakeholders. The research approach also allows the researcher to make meaningful conclusions as she is able to correlate the empirical evidence with the theoretical model.

4. Findings / Results

4.1 Emerging Themes from Data

The qualitative analysis found that there were several important themes that demonstrated the transformational role of generative artificial

A Qualitative Perspective of Exploring the Role of Generative AI in Transforming Healthcare Systems

intelligence in healthcare systems. Among the predominant themes that are predominant is the automation of administrative and clinical activities, in which generative AI devices bring to a minimum the documentation, and simplify the routine activities. The other important theme is better clinical decision-making, where AI-assisted systems help healthcare workers to diagnose diseases and suggest treatment options in a more accurate manner.

Another theme found is enhanced patient engagement and communication, which is enhanced by AI-powered virtual assistants and chatbots. Data integration and interoperability were also identified as key advantages by the participants, in which case generative AI allows to utilize fragmented healthcare information better. Moreover, the issue of organizational productivity and the optimization of costs became one of the key topics, which also represents the overall effects of AI on the performance of the healthcare system.

4.2 Stakeholder Perceptions

Clinicians

The feelings of clinicians toward generative AI technologies were mostly cautiously optimistic. They recognized the advantages of less administrative load and better diagnostic assistance. Nevertheless, the over-dependence on AI systems, possible inaccuracies, and the absence of transparency in the output of AI systems were brought up. There was a great deal of stress on the human oversight and clinical judgment of the decisions made by clinicians.

Healthcare Administrators

Generative AI was seen by healthcare administrators as an instrument of strategic efficiency and cost reduction in operations. It was emphasized that it improves the workflows, optimizes the use of resources, and contributes to data-driven decision-making. Nonetheless, the administrators also raised the issues connected with the implementation cost, the integration issues, and the necessity to have specific regulatory frameworks in order to understand the direction of AI adoption.

4.3 Generative AI in the Real World.

The research has found some practical uses of generative AI in medical practices. Hospitals are adopting AI technology to provide automated clinical documentation to save time that would otherwise be used in maintaining manual records. Medical imaging AI-generated models can be used to identify abnormalities and analyze radiological data. Drug discovery and personalized medicine are also being used with generative AI, where it is used to speed up

the generation of treatment options customized to each patient.

Also, patient communication and constant support are developed by means of virtual health assistants. The accuracy and efficiency of treatment planning have been enhanced in some healthcare institutions that have adopted AI-driven systems with the aim of clinical decision support. These applications illustrate the fact that generative AI can be useful in the field of healthcare delivery.

Key Findings Table

Theme	Description	Impact on the Healthcare System
Automation of Tasks	AI reduces documentation and administrative workload	Increased efficiency and reduced clinician burnout
Clinical Decision Support	AI assists in diagnosis and treatment recommendations	Improved accuracy and faster decision-making
Patient Engagement	Use of AI chatbots and virtual assistants	Enhanced patient communication and satisfaction
Data Integration	AI enables better use of fragmented healthcare data	Improved continuity of care and informed decisions
Organizational Efficiency	Streamlining workflows and reducing operational costs	Better resource utilization and system performance
Adoption Challenges	Issues related to trust, integration, and skills gap	Slower implementation and resistance to change

5. Discussion

5.1 Interpretation of Findings

The results show that generative AI is an innovative factor in the healthcare system that contributes to better efficiency, clinical outcomes, and decision-making. These findings are consistent with the existing body of literature that highlights the opportunities of AI to automate work and optimize the workflow. Theoretically, the results agree with the Technology

A Qualitative Perspective of Exploring the Role of Generative AI in Transforming Healthcare Systems

Acceptance Model, because the perceived usefulness and ease of use are relevant to adoption in health care personnel.

The gradual pattern of adoption also responds to the Diffusion of Innovation Theory, where institutions proceed through initial test to wider adoption. Moreover, the Sociotechnical Systems Theory can be seen in the relationship between AI technologies and the human population, which means that it is necessary to balance technological advancements with organizational and social aspects.

5.2 Effect on the Healthcare System.

The influence of generative AI on healthcare systems is very extensive on various levels. On the organizational level, it facilitates change through facilitating data-driven decision-making and digitalization. The application of AI in healthcare institutions is rising to enhance cost-efficiency and efficiency in operations.

Generative AI, in workflow terms, can help with workflow redesign as it automates routine tasks and simplifies the work, which allows healthcare professionals to concentrate on patient care. This translates into increased productivity and minimization of burnout of clinicians.

On the patient side, AI will improve patient-centered care through the ability to offer personalized treatment, communication, and an ability to make healthcare services more accessible. Such enhancements lead to improved patient outcomes and increased levels of satisfaction.

5.3 Challenges and Limitations

Although generative AI is advantageous to use in healthcare, its implementation is also linked to several challenges. The question of data privacy and data security is one of the ethical issues that continues to be a dominant point of concern because AI systems are based on sensitive patient data. The issue of bias and fairness in AI algorithms is also an area of concern that might result in unequal healthcare outcomes.

There are technical barriers, such as integration with the current healthcare systems and the complexity of AI technologies, which are quite challenging. Also, the problem of regulation and the absence of clear governance systems make AI unpredictable. These issues demonstrate that the application of generative AI in healthcare systems should be carefully planned and reasonably adopted.

6. Implications

6.1 Practical Implications

The results offer good recommendations to health organizations that want to adopt generative AI

technologies. The institutions need to concentrate on the creation of AI systems that are user-friendly, proper training of professionals in the health sector, and the integration of the systems with the current systems. It is also necessary to focus on human control of AI so that it can be used safely and efficiently.

6.2 Policy Implications

The paper highlights the importance of having detailed regulatory mechanisms to regulate the use of generative AI in the medical field. Responsible AI use should be determined through guidelines set by policymakers on data privacy and security, and ethical use. There must be mechanisms of standardization and accountability to bring transparency and trust to AI systems.

6.3 Academic Implications

This research work can add to the academic literature as it presents qualitative information on the role of generative AI in healthcare transformation. It emphasizes the necessity of additional studies of the experiences of stakeholders, system-level effects, and generic consequences of adopting AI. The next step of research can be to provide quantitative validation and comparative studies in various healthcare contexts.

7. Conclusion

The study concludes that generative artificial intelligence may change the healthcare system in a significant way, making it more efficient, clinical, and patient-centered. Although the technology has a significant number of advantages, ethical, technical, and regulatory issues must be resolved to implement it successfully.

The results indicate the need to focus on a middle way of embracing technological innovation, human, and organizational factors. With the fact that the healthcare systems keep developing, the use of generative AI will certainly become a significant part of the creation of the future of healthcare delivery, where it would be more efficient, accessible, and responsive to the needs of patients.

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A Qualitative Perspective of Exploring the Role of Generative AI in Transforming Healthcare Systems

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A Qualitative Perspective of Exploring the Role of Generative AI in Transforming Healthcare Systems

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