Original Article

ROLE OF AI IN HOSPITAL ADMINISTRATION DECISION-MAKING: A NARRATIVE REVIEW ON SAUDI HEALTHCARE SYSTEM

Abdulmajeed Ibrahim Alfuraih[1], Mazen Abdullah Alshalhoob[1], Mohammed Abdulaziz Altuwayjiri[1], Ohood Bandar Alferm[1], Abdulaziz Suliman Bin Maneea[1]*

[1]Department of Dentistry, Ministry of National Guard Health Affairs, Riyadh, Saudi Arabia. mohammadaltwijri9@gmail.com

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ABSTRACT

This article is a narrative review discussing the role of AI in the decision-making process of hospital administration in Saudi healthcare, how it is used, and its impact on efficiency, obstacles, and implications of the policy. The method of the narrative literature review was selected, and it required the examination of the peer-reviewed articles that were published from 2019 to 2025. The databases that were utilized to determine relevant literature were: PubMed, Scopus, and Google Scholar. The findings indicate that AI tools, including predictive analytics, clinical decision support systems, and workflow optimisation tools, have a massive influence on operational efficiency, enable one to make correct decisions, and improve patient outcomes. Administration that is done using AI in the hospital system results in improved allocation of resources, reduced waiting time, and delivery of services. Artificial intelligence is not yet advanced in Saudi Arabia, although it is well aligned with the goals of healthcare transformation, as pointed out in Vision 2030. The key challenges include the high cost of implementation, lack of technical expertise, opposition to the alterations, and such ethical considerations as data privacy and biased algorithms. AI has painted a wonderful prospect to improve decision-making by the hospital administration in Saudi Arabia. In order to have a successful introduction of AI, one must invest in a strategic way, prepare the workforce, and establish effective governance systems in such a way that they will have sustainable and ethical application in the healthcare field.

Key words: Artificial intelligence, Health administration, Healthcare management, Vision 2030.

Introduction

The use of artificial intelligence (AI) is quickly becoming a game-changer in the world's healthcare systems, allowing more detailed data analysis, predictive modelling, and automated work at complex levels. The overall trend toward the use of AI technologies in healthcare has greatly contributed to the optimization of clinical and administrative processes to aid better and more timely decision-making. The contemporary hospitals are highly complex settings in which huge amounts of data on the patients, issues in the resource allocation, and demands on the operational process necessitate effective and smart management systems. Because of this, there is an increased necessity for data-driven decision-making tools that can enhance efficiency, minimise errors, and optimise healthcare delivery [1, 2]. Nevertheless, technological advancements still do not provide hospitals with sufficient resources to address the key problems that include the lack of resources, operating inefficiencies, and rising patient demand. The result of such issues is that they tend to cause delays in decision-making, poorer quality of care, and a heavy administrative load. The management strategies used traditionally cannot manage the complexity and magnitude of the contemporary healthcare systems. Here, AI-based decision support systems are also being described as a possible solution so that healthcare administrators could make superior, more correct, and more timely decisions as a result of real-time data and predictive analytics. The healthcare sector in Saudi Arabia is undergoing a major transformation with the help of Vision 2030, which aims at enhancing the quality of healthcare services, access, and efficiency through digital innovation. One of the primary aspects of this change is the introduction of AI and digital health technologies, which are used to control the hospital more efficiently and to offer high-quality services. The available literature highlights that the implementation of AI in the Saudi healthcare system is still in its initial phases, but has a substantial chance to address the issues existing in the system and help to improve its functioning [3-5]. The aim of the current narrative review is to examine the significance of artificial intelligence in the decision-making process of the hospital administration in the Saudi system of healthcare, regarding its operational efficiency, challenges, and implementation strategies.

Materials and Methods

The proposed research was in the form of a narrative literature review to explore the application of artificial intelligence in the decision-making process in hospital administration within the Saudi healthcare system. In order to perform a deep and flexible synthesis of the existing literature, a narrative method was selected, which allows for identifying the most significant themes and conclusions by different researchers. The collection of the relevant

literature on the online academic databases of PubMed, Scopus, and Google Scholar was performed on the basis of the peer-reviewed journal articles. The years between 2019 and 2025 were used to search and identify the latest sources on the subject of artificial intelligence and healthcare management. The keywords of artificial intelligence, hospital administration, decision-making, and Saudi healthcare were used to identify the appropriate studies. The inclusion criteria were based on the fact that the study had to discuss AI applications in the healthcare sector, specifically in relation to hospital management, decision support systems, and operational efficiency, with a particular focus on Saudi Arabia, where possible. The exclusion criteria were non-healthcare-related AI studies, non-peer-reviewed publications, and articles that were not relevant to administrative decision-making. The chosen articles were examined on the basis of the thematic approach, which made it possible to identify common trends in terms of AI applications, benefits, implementation problems, and Saudi-specific developments. The methodology is aligned with the existing healthcare investigative procedures that focus on the qualitative synthesis of complex systems [6, 7].

Results and Discussion

AI applications in hospital administration

The literature proves that artificial intelligence is being more and more used in hospital management to improve their efficiency in operations and resource task control. AI-based approaches are popular in resource management, which can allow hospitals to optimise the level of staffing, bed management, and the use of equipment. Predictive analytics can be used to enable an administrator to estimate the number of patients that will be admitted and distribute resources, thus minimizing the number of patients stuck in line and enhancing service provision. Also, AI supports the management of patient flows with the help of real-time analysis to reduce waiting time and increase throughput. Artificially intelligent scheduling systems promote efficiency even more by automating staff and appointment scheduling. The applications make the processes of hospitals more efficient and the interaction among departments more organized [8-10].

Role of AI in decision-making

Artificial intelligence is important in improving decision-making in hospital administration using both clinical decision support systems (CDSS) and data-driven analytics. Such systems help medical workers to make evidence-based suggestions, to enhance the accuracy of the diagnosis, and in treatment planning. In addition, AI can also analyze data in real-time, which allows administrators to make informed decisions at any time in the dynamic healthcare environment [11-13]. Predictive decision-making achieved through the incorporation of machine learning algorithms into hospital systems can be used to compute the operational strategy and the existence of prospective risks. Consequently, AI helps healthcare facilities make decisions based on better accuracy, consistency, and efficiency [14, 15].

Impact on efficiency and performance

AI technologies have demonstrated high levels of progress in hospital efficiency and performance. Research performed suggests that AI lowers the number of human errors because it automates routine administrative functions and provides data-driven insights to assist clinical decision-making. This results in increased speed of decision-making and increased productivity of operations. Moreover, AI has a positive effect on patient outcomes, as AI will help diagnose, give individual treatment regimes, and intervene on time. With the help of advanced algorithms, healthcare providers are able to work with large amounts of data in a short period of time and ensure high precision in their work, which leads to more efficient healthcare delivery [16-21]. Altogether, AI improves the effectiveness of administration as well as the effectiveness of clinical systems in hospitals [22, 23].

AI adoption in Saudi Arabia

The implementation of AI in the sphere of Saudi Arabia is at its initial phase, but the pace of its development is high [24-34]. The Vision 2030 program of the Kingdom focuses on the digitalization and innovation of the healthcare sector, and AI is seen as a major force for development. The existing facts indicate that the knowledge and the willingness to implement AI are growing among healthcare workers, but the practical application is less than expected. Nevertheless, the introduction of AI technologies into the hospital systems with the aim of enhancing efficiency and service quality has a strong governmental backing. It shows that the trend is good and that more investment and planning are still needed to bring AI to its fullest potential in hospital administration [35, 36].

Barriers and challenges

Despite the fact that it may have numerous benefits, the introduction of AI in the work of the hospital administration is connected with some significant issues. One of the primary obstacles that can limit access to healthcare institutions is the expensive nature of creating and implementing AI technologies. In addition, the lack of technical skills and training of health care workers is also a barrier to successful adoption [37-43]. The other critical issue is changing resistance because the staff members may be reluctant to put their trust in AI mechanisms. Also, the obstacle to the implementation of AI in the existing healthcare systems may be organisational and infrastructural. In order to resolve such problems, certain measures are to be implemented, including training of the labor force, investing in the infrastructure, and managing the change [7, 44, 45].

Ethical and governance issues

Ethical and governance concerns are another major challenge to the implementation of AI in healthcare. The problems of biases in algorithms, data privacy, and

responsibility should be discussed attentively to make the use of AI technologies safe and equal. Discriminatory algorithms might result in unequal treatment results, and poor data security steps might be used to break patient privacy. Also, the absence of effective regulatory frameworks makes one wonder about the issue of responsibility and accountability in AI-driven decision-making. It is vital to create transparency, fairness, and compliance with ethics; therefore, to ensure trust in AI systems and support the introduction of AI into the hospital administration on a sustainable basis [46-48].

Interpretation of findings

These review findings reveal that artificial intelligence plays a major role in facilitating decision-making by administration in hospitals by increasing efficiency, accuracy, and responsiveness. AI-based systems can help healthcare administrators handle large data sets and create actionable insights, which will result in better operational results and patient outcomes [14, 22]. Such results are in line with the existing studies that show the importance of AI in assisting data-driven healthcare management. Nevertheless, in spite of these advantages, the uptake of AI in different healthcare systems is still unequal based on the differences in infrastructure, workforce preparedness, and organisational support [6, 7].

Comparison with global literature

Saudi Arabia has yet to adopt AI at a global level in healthcare delivery. With already established advanced healthcare systems, AI has already been implemented in both clinical decision-making and administrative processes in large-scale usage, but Saudi Arabia is lagging. This gap indicates variations in the level of technological advancement and institutional maturity. According to the existing literature, AI can potentially have transformational potential on an international scale, but its practice usually has local limitations, including policy frameworks and the availability of resources [1, 15]. Consequently, Saudi Arabian development is in line with the general trends in the global emerging healthcare systems.

Implications for hospital management

The use of AI in hospital administration has enormous consequences for management practices. AI can be more effective in the planning process, as it allows the use of predictive analytics to identify patient demand and resource use. It also facilitates data-oriented leadership, whereby managers of the hospital are able to make strategic decisions that are informed by real-time data. In addition, the use of AI implies the change of workforce, as medical professionals will have to acquire new skills to communicate with AI systems efficiently [10, 49]. This demonstrates the significance of life-long learning and organisational transformation towards effective AI integration.

Policy implications

Policymaking-wise, the successful application of AI in Saudi healthcare should be coordinated with the goals of V2030. The government should work on enhancing its digital infrastructure and encouraging the use of AI, and make technological resources accessible equally. Also, the training programmes play a vital role in increasing the AI literacy of healthcare workers and decreasing the resistance to change [15, 16] . The regulatory systems are also required to confront the issues of ethical concerns, data privacy, and accountability in AI-based decision-making [19, 20] . These will enhance the inclusion of AI in the administration of hospitals in a sustainable manner.

Limitations of the study

This study has a number of limitations in this study. Being a narrative review, it is vulnerable to possible bias when choosing and interpreting literature. It does not follow a strict methodological framework, as is the case with systematic reviews, which can be detrimental to reliability. Also, the number of Saudi-specific empirical research studies on the topic of AI in hospital administration is limited, which limits the scope of the contextual analysis [18]. The future studies ought to concentrate on the primary data gathering in the Saudi healthcare system to offer more valuable data.

Conclusion

This literature review shows that artificial intelligence plays an important role in improving hospital management decision-making. The results indicate that AI can be used to enhance the effectiveness of operations, proper allocation of resources, and faster and data-driven decision-making in healthcare facilities. AI has demonstrated a high potential to enhance the administrative performance as well as patient outcome through applications like predictive analytics, clinical decision support systems, and workflow optimisation. Regarding Saudi Arabia, the healthcare sector is actively developing the digital transformation within the context of Vision 2030, and the use of AI as an enabling element of the innovation is gaining more and more popularity. Despite this, there are still several challenges, including high implementation costs, unreadiness of the workforce, and absence of ethical and governance problems. These obstacles need to be overcome to maximise the potential of AI in hospital management. The effective implementation of AI in the administration of Saudi Arabian hospitals demands not only technological progress but also policy-level, workforce preparation, and ethical governance systems.

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