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Literature Review

Factors Influencing the Use of Artificial Intelligence in Disease Management in Saudi Arabia

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Abstract

Background: Healthcare systems invest in procedures that can help in addressing the disease management needs. Disease management must consider the inputs that would enable preventive and intervention-based processes in addressing the healthcare needs. The use of Artificial Intelligence (AI) focuses in the human-simulated intelligence that can be incorporated into healthcare. The aim of the review was to evaluate the application of AI in disease management in Saudi Arabia.

Methodology: The research used a systematic review approach, which focuses in critical appraisal of articles. The review used the PRISMA flowchart and the JBI checklists as the research tools to help in article selection. The review selected and used 13 articles that met the inclusion criteria set for the review.

Results: The findings indicated that the use of AI had direct implications in the management and actualization of the disease management in Saudi Arabia. AI enabled the management of diseases through addressing medication errors, issues with managing patient needs, information access and the overall actualization of the quality of the healthcare outcomes from the healthcare system. The implementation of AI would therefore help in building the required capacities and strategies that can generate the healthcare quality processes.

Conclusion: The use of the AI system can be used as part of the strategic measures for managing diseases in Saudi's healthcare system. The aim would be to address the approaches and inputs that can help meet disease management needs, through the AI applications.

Keywords: Artificial Intelligence; Disease Management; Healthcare Technology; Saudi Arabia; Health System Transformation; AI Adoption

Abbreviations

AI: Artificial Intelligence; JBI: Joanne Briggs Institute; NTP: National Transformational Program; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Introduction

Background Information

Disease management is an important approach when it comes to regulating the occurrence, incidence and prevalence of illnesses in the healthcare system [1]. The international approach towards disease management capitalizes on the ability to utilize disease intelligence to prevent, manage and actualize the healthcare management processes. The actualization of the disease management procedures would therefore be based on the need to meet and manage the occurrence of the diseases. At the national level, the disease management procedures are incorporated into the healthcare policies, with the intention of building the required capacities [2]. The realization of the healthcare outcomes is based on the management of the disease criteria for the specific population, which creates the need for national and contextual considerations. The focus should be to generate the required procedures towards sustaining the healthcare quality and outcomes to help meet the patient care needs [3]. In disease management, the focus would be on the ability to address the requirements towards sustaining the information on diseases, such as the preventive, management and intervention-based processes.

Healthcare technologies have been part of the influencers of better disease management, through creating, analyzing and actualizing the various approaches towards the diseases [4]. Artificial intelligence (AI) has been one of the technologies used, focusing on boosting and optimizing disease-based decisions. The aim has been to use the AI as a source of influencing the expected gains, which would include precisions and capacity development. The increasing investments in the fields of artificial intelligence provides an avenue for evaluating and integrating the implications of the artificial intelligence in healthcare [5]. The need for improved clarity and precision in diagnosis, management and prevention of diseases would be integrated into the healthcare systems to help address the requirements towards improving the disease management criteria. The implementation of the AI technologies has been consistent with the need to have strategic healthcare inputs, which would help in managing the occurrence and prevalence of diseases.

Problem statement

The project seeks to evaluate the role of the artificial intelligence in promoting disease management in Saudi Arabia. Artificial intelligence is one of the contemporary technologies that have been influencing the healthcare sector, with implications n decision making and planning to mitigate and manage diseases [6]. The research gap comes in the determination of the implications that the AI could have in actualizing disease management, in the Saudi Arabian context. By focusing on how AI influences disease management in Saudi Arabia, the review will provide valuable insights into the integration of AI technologies in the healthcare system. The methodology ensures a thorough evaluation of recent literature, which is crucial for understanding current trends and challenges. The systematic review will therefore collect information on how the actualization of the artificial intelligence would influence the management of various diseases.

Research objectives

The research objectives for the research are as follows:

- To determine the current use of artificial intelligence in Saudi's healthcare system
- To establish the link between the use of artificial intelligence in healthcare and disease management in Saudi Arabia
- To recommend best practices that would ensure the use of artificial intelligence in disease management in Saudi Arabia

Research questions

The research question used for the review is:

- How does the implementation of artificial intelligence influence disease management in Saudi Arabia?

Literature Review

Review of literature

Artificial intelligence in healthcare

According to Siontis., *et al*. (2021) [7], artificial intelligence (AI) refers to the development of computers that can learn and reason an act in a manner that simulates human intelligence. The computers and machines can therefore be applied for different

applications, which creates better management of the decisions and the data management processes. According to Yu., *et al*. (2022) [4], the functionality of the AI systems depends on neural networks that promotes logical and rational approaches in handling data. The systems can therefore learn, recognize, analyze and connect between the data patterns creating an implication on the capacity developed for the outcomes. In the healthcare systems, the AI practices have focused on the ability to influence precisions and management of the data collected [8]. For example, the application of the robot-based surgeries has been a major milestone in the AI application in healthcare. The AI systems are therefore part of the technologies that would influence the faster and effective ways to help address the different diseases and the requirements to manage their occurrences.

The role of technologies in Saudi's healthcare system has been increasing, with the focus on promoting access to care [5]. The use of artificial-intelligence (AI) in healthcare has been related to capacity development and improvements to help attain the quality of care. With such an approach, the investments expected in the realization of the AI systems would come from the continuous technological development. In the healthcare privatization strategy, it has been critical to focus on the respective investments that would help in promoting the healthcare quality outcomes [8]. The aim would be to integrate the requirements towards meeting the inputs needs, which would help develop the expected outcomes. The use of AI has therefore been art of the gains from the privatization of healthcare, which has been critical when addressing the requirements towards meeting the healthcare outcomes.

In Saudi's vision 2030, the use of healthcare technologies has become a consistent input, which would help influence the overall actualization of the AI-based technologies [5]. The national approach on the use of the AI systems has been related to the goals of technological advancements and the need to focus on disease management. Under the National Transformation Program (NTP), the Saudi Arabia has focused on the need to increase the management of the technological inputs in healthcare. Such an approach has been critical in promoting the use of artificial intelligence, as a factor for establishing quality in the access to care in Saudi Arabia [3]. The aim would be to improve the access to care and build the capacities to address the demands from the healthcare system, which includes in the disease management processes.

Disease management in Saudi Arabia

According to Rajpurkar., *et al*. (2022), disease management refers to the holistic, proactive and systematic approaches used in healthcare delivery. The disease management structure therefore determines the ability to set the healthcare outcomes that would enable the actualization of the population health needs. The proactive approaches create the proactive criteria, which includes personal responsibility, with the systematic approaches creating frameworks to tackle diseases within the systems [8]. The occurrence of diseases that affect population health has also been an influencer of public health approaches. The realization of effective disease management would depend on the policy approaches developed to address the disease management requirements. The international, regional and national policies in disease management capitalize on the best practices to handle the various diseases, which can emanate from appreciation of their incidence and the required management inputs [7]. The disease management concepts have therefore been transitional with the upcoming issues, which has determined the requirements to actualize the healthcare outcomes.

The need for disease management is one of the major concepts in Saudi's healthcare transformation journey [9]. The transformation is based on efficient and effective strategies that would influence the actualization of the healthcare processes in the country. The disease management goals are based on the sustainable practices in healthcare that would help reduce the occurrence and prevalence of diseases. The classifications of the diseases to communicable and non-communicable has been a strategic approach that has influenced the investments towards disease management [1]. The investments towards the healthcare systems have been guided by the need to address the issues that could affect the realization of the preventive and intervention-based care. Such investments include the use of the technologies that would influence the data collection and management [10]. The information systems have been considered as an important criterion that guides on the access to patient data, decision making and actualizing the intended outcomes based on the disease requirements.

At the national level, the realization of the disease management needs would depend on the contextualized needs [10]. Such needs have been consistent with the changes and demands affecting Saudi Arabia's healthcare system. Factors such as increasing population

and the demand for quality healthcare have been instrumental in influencing the need to address the actualization of the effective aspects in building a healthcare system for the country. Investments in the healthcare capacity would be critical, since it would address the demands, while sustaining the quality processes. The realization of the goals would be based on the continuous investments in infrastructure and commitments towards attaining the intended healthcare outcomes [1]. Policy development and implementation would therefore be influenced by the capacity development, based on the upcoming needs. The healthcare policies should embrace the technological and systematic changes that can promote disease management, as a factor for developing healthcare quality.

Utilization of artificial intelligence in disease management in Saudi Arabia

The development of technological inputs for the disease management processes depends on the role of the 7system in addressing the various healthcare needs [7]. In disease management, factors such as information access, timely diagnosis and preventive approaches remain integral in promoting effectiveness. With the use of AI technologies, studies have shown links between the use of the AI in healthcare and improvement in preventive and consistent care [11]. For example, AI developed personalized access to medicinal care, which enables the management of diseases, based on the individual case basis. The improvement in the preventive care is based on the access to information and the ability to use the information for healthcare decisions. The decisions made are influenced by the commitments and plans to address the requirements for preventive approaches across the different disease management requirements. The consistency factor comes from the sue of system that can accommodate the different needs to build the intended outcome [12]. The AI provides a reliable approach that can help in meeting the needs defined by the various disease management, which is crucial for attaining quality in the healthcare outcomes.

In the development of the AI systems in healthcare, one of the focus areas is to deal with the specific diseases, and the patient needs [10]. The logical and rational inputs that come with the AI systems guide the healthcare professionals in terms of precise diagnosis and management needs. With the access to the big data analytics and the inputs towards decision making, the AI systems provide an avenue for managing patient care needs [13]. The focus would be to promote realization of patient-based approaches which would generate the required effectiveness, when it comes to building the capacity for managing care. The patient-based approaches in AI emanate from the utilization of the specific data and information relating to the patients or the specific diseases. The AI systems have therefore been integral when addressing the timely reaction to various diseases, which is crucial when promoting better procedures for managing the healthcare needs [3]. The inclusion of AI-based monitoring process, diagnosis and clinic approaches remains a crucial boost when addressing the requirements for disease management.

The application of the AI systems and processes is another critical factor when it comes to establishing the benefits expected when addressing the disease management needs [8]. In Saudi Arabia, the prevalence and use of the AI in healthcare has been slow, due to the gaps affecting its full implementation. Factors such as infrastructure and resource development has remained a determinant on the scale of application, which is a critical factor when addressing the prevalence of AI in disease management [10]. The capital needs and the resource factor remain a determinant, especially when establishing the requirements to sustain the gains from the AI application in healthcare. In disease management, AI faced challenges in the adoption rate, due to the cultures that uphold conventional healthcare strategies [13]. The realization of the healthcare quality from the use of AI has therefore been based on the ability to deploy the required resources and actualize the procedures for improved decision making through the information accessed.

Materials and Methods

Research design

The current research utilizes a systematic review method. A systematic review refers to the extraction and interpretation of the published studies. The systematic review will analyze, describe and appraise the interpretation to enable the realization of the existing research topic and objectives [3]. The comprehensive systematic review approach focuses on the utilization of medical literature that relates to the research topic to appraise data and meet the research requirements.

Research instrument

The research instruments used for the systematic review are the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and Joanna Briggs Institute (JBI) checklists. The PRISMA flowchart helped to deploy the inclusion and exclusion criteria, including publications relating to the title, published in the last five years and with definite methodologies. The JBI checklist will help address the qualitative assessments of the articles, based on the 13-questions developed in the checklist.

Sampling strategy and setting

This systematic review adopted a comprehensive approach to assess the impact of artificial intelligence (AI) on disease management in Saudi Arabia [10]. A rigorous search strategy was employed across major databases, including PubMed, Scopus, and IEEE Xplore, focusing on literature from the last five years. Relevant studies were identified using keywords as follows "artificial intelligence, AI, AI in healthcare, AI in Saudi Arabia "disease management,", Saudi Arabia healthcare, Health system Saudi, KSA health, Saudi disease management, health technologies and "Saudi Arabia." Each selected study was evaluated for its relevance to AI applications in disease management. The inclusion and exclusion criteria for the review are as shown below.

Inclusion criteria

- Academic articles that have been published between 2019 and 2024 to offer updated information
- Articles providing information in the use of artificial intelligence and disease management
- Articles that have a defined methodology and findings
- Articles written in English language

Exclusion criteria

- Articles published before 2019
- Articles that do not have a definite methodology and/or findings
- Articles that do not have information on the role and use of artificial intelligence in managing diseases
- Articles not written in the English language

Data analysis

The data analysis was guided by the PRISMA and JBI analysis, which helped in analyzing the nature of data collected and the implications on the search. Data extraction aimed to highlight AI's contributions and challenges, with findings analyzed thematically to understand its effects on healthcare outcomes. The extraction targeted databases such as Google Scholar, PubMed, Scopus and IEEE Xplore. The focus was to relate the data collected to the research question, which helped in developing the discussions expected for the research.

Data reliability

The data reliability evaluates the consistency of the data collected, based on the objectives. The data reliability should enable the unreliability between the respective articles and the respective objectives. Such an approach would ensure that the data used is consistent to meet the research expectations.

Data validity

Data validity helps determine the effectiveness of the data collected, based on the research questions. The systematic review should consider the existing research questions, which guides on the determination of the data validity. The research question will guide on the thematic approaches considered when collecting and utilizing the data.

Results

Findings

The current section covers the findings, which has several sections. The first section is the PRISMA flowchart that has enabled the implementation of the inclusion ad exclusion criteria. The chart helped determined the number of articles selected for the study. The second section is the table that describes the included studies. The table helps to identify the information deemed important based on the current research objectives. The last section is the JBI checklist, which uses the checklist questions to evaluate the quality of the articles used.

PRISMA flowchart

The PRISMA flowchart diagram represents the processes involved in the article selection. The article selection process

utilized the inclusion and exclusion criteria which guides on the qualified articles. After the application of the criteria, articles were selected, based on their qualification, as shown in the figure 1 below.

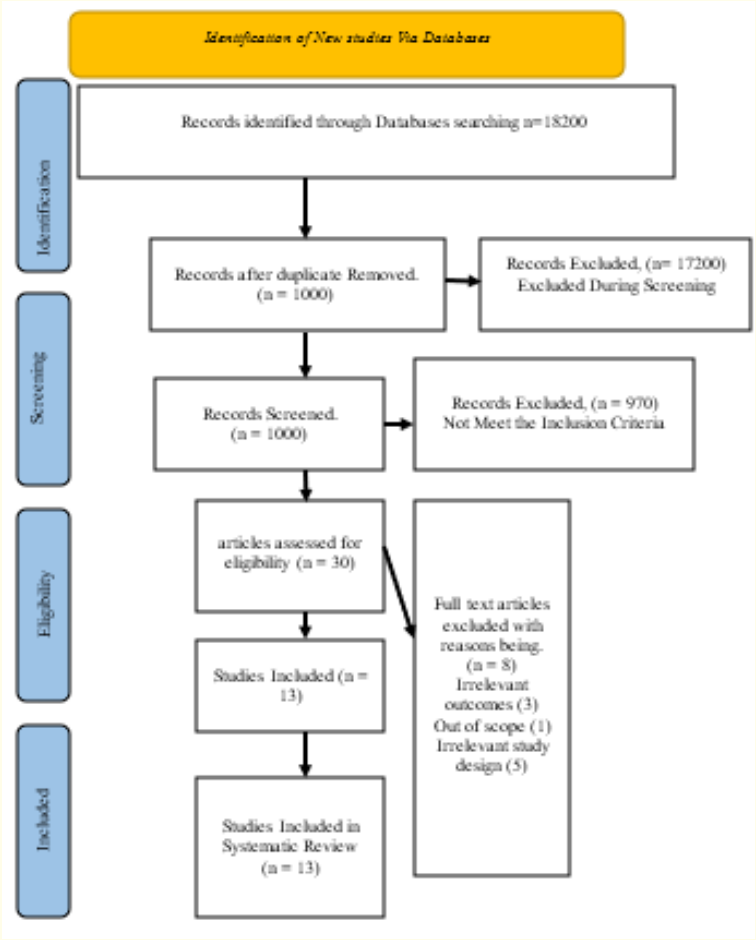

Figure 1: PRISMA Flowchart Diagram.

Table of included studies

Table 1 has focused on the characterization of the articles selected. From the 13 articles selected, Google Scholar had 6, PubMed had 2, Scopus had 3 and IEEE Xplore had 2 articles. The table focused on the main findings that relate to the respective objectives used in the research.

From the table of included studies, it is evident that the use of Artificial Intelligence (AI) has had implications on the disease management processes. The studies linked the AI use to the presence of infrastructure and cultures that would support the actualization of the AI systems within the healthcare system. The opportunities included the need to work with contemporary

Author and Year	Research Title	Study Design	Sample size and Characteristics	Main Findings
Aboalshamat., *et al*. 2022	Medical and dental professionals' readiness for artificial intelligence for Saudi Arabia vision 2030.	Online questionnaires	334 medical and dental students in Saudi Arabia	Over 90% (302) of the participants indicated low readiness for use of AI in healthcare, attributed to the lack of training and exposure to AI
Alanzi., *et al*. 2023 [14]	Factors Affecting the Adoption of Artificial Intelligence-Enabled Virtual Assistants for Leukemia Self-Management	Online survey	397 leukemia patients	The patients identified the ease of use, perceived effectiveness and functionality as major influencers of the use of AI amongst the leukemia patients
Alghamdi and Alashban 2023	Knowledge, attitudes and practices towards artificial intelligence (AI) among radiologists in Saudi Arabia	Cross Sectional Study	129 radiologists	69% of the respondents knew about AI, with 17% of the participants having worries that AI might take up their jobs, thereby having minimal concerns on its utilization
AlJarallah, 2023 [15]	Investigating the influence of artificial intelligence on quality management in healthcare centers.	Questionnaire	233 healthcare professionals	The research indicated a positive relationship between the use of artificial intelligence an improvement in quality of outcomes, despite the challenges of infrastructure development
Almazroi., *et al*. 2022 [11]	An empirical study of factors influencing e-health services adoption among public in Saudi Arabia.	Questionnaire	314 respondents	The adoption rate included factors such as access to technologies, trust and convenience, ease of use and the requirements to utilize these technologies
Alqudaihi., *et al*. 2021	Cough sound detection and diagnosis using artificial intelligence techniques: challenges and opportunities	Survey questionnaire	48 patients	Although all respondents agreed that AI would help improve the healthcare access, issues of consistency and the human touch remained concerns for the patients
Amin and Alanzi, 2024	Utilization of Artificial Intelligence (AI) in Healthcare Decision-Making Processes: Perceptions of Caregivers in Saudi Arabia.	Survey questionnaire	224 healthcare professionals	The main factors determining the use of AI included the exposure levels, utilizations at the facilities and the personal skills and capacities

Rabaan., *et al*. 2022 [10]	Application of artificial intelligence in combating high antimicrobial resistance rates.	Survey questionnaire	100 medical professionals	The need for including AI was related to the need to have timely and effective strategies to manage antimicrobial diseases
Rajpurkar., *et al*. 2022 [16]	AI in health and medicine.	Survey questionnaire	400 respondents in the healthcare sector	The use of AI was considered as part of the criteria and measures that can influence the management of healthcare conditions
Saeed., *et al*. 2023 [17]	Saudi Arabia Health Systems: Challenging and Future Transformations With Artificial Intelligence.	Survey questionnaire	100 healthcare stakeholders	The main factors relating to the use of AI would include access to the required infrastructure, resources and the willingness to adopt to AI
Siontis., *et al*. 2021	Artificial intelligence-enhanced electrocardiography in cardiovascular disease management	Survey Study	50 healthcare professionals	The use of AI in managing cardo-based interventions has been increasing, due to the ability to influence the precision in managing healthcare
Syed and Al-Rawi, 2024	Community pharmacists awareness, perceptions, and opinions of artificial intelligence: a cross-sectional study in Riyadh, Saudi Arabia.	Cross sectional Study	200 community pharmacists in Saudi Arabia	186 pharmacists indicated the need for more exposure and training on the use of AI, as part of delivering the intended inputs when addressing the management of the healthcare processes
Yu., *et al*. 2022	Improving chronic disease management for children with knowledge graphs and artificial intelligence	Questionnaires and interviews	36 policy makers	The application of AI had an implication on the ability to influence disease management, in terms of monitoring the interventions

Table 1: Table of Included Studies.

technologies, the role of Saudi's vision 2030 and the actualization needs towards promoting healthcare quality. The main gaps came in the investments in terms of capital and the challenges in the accommodation of the AI due to cultural factors.

JBI assessment

The JBI assessment has 8 questions, which are evaluated for each of the articles included in the review. The questions are as follows:

- Is the review question clearly and explicitly stated?
- Were the inclusion criteria appropriate for the review question?
- Was the search strategy appropriate?
- Were the sources and resources used to search for studies adequate?
- Were the criteria for appraising studies appropriate?
- Was critical appraisal conducted by two or more reviewers independently?

JBI Table

Author and Year	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Score
Aboalshamat., *et al*. 2022	Y	Y	Y	Y	Y	N	Y	Y	87.5%
Alanzi., *et al*. 2023 [14]	Y	Y	Y	Y	Y	Y	Y	Y	100%
Alghamdi and Alashban 2023	Y	Y	Y	Y	N	Y	Y	N	75%
AlJarallah, 2023 [15]	U	Y	Y	Y	Y	Y	Y	Y	87.5%
Almazroi., *et al*. 2022	Y	Y	Y	Y	Y	Y	Y	Y	100%
Alqudaihi., *et al*. 2021	Y	Y	Y	Y	Y	N	Y	Y	87.5%
Amin and Alanzi, 2024	Y	N	Y	Y	Y	Y	Y	Y	87.5%
Rabaan., *et al*. 2022	Y	U	Y	Y	N	Y	Y	Y	75%
Rajpurkar., *et al*. 2022	Y	Y	Y	Y	Y	N	U	Y	75%
Saeed., *et a*l. 2023	Y	Y	Y	Y	Y	Y	Y	Y	100%
Siontis., *et a*l. 2021	Y	Y	Y	Y	Y	Y	Y	Y	100%
Syed and Al-Rawi, 2024	Y	Y	Y	Y	Y	Y	Y	N	87.5%
Yu., *et a*l. 2022	Y	Y	Y	Y	Y	Y	Y	U	87.5%

Table 2: JBI Table.

Discussion

Use of artificial intelligence in Saudi's healthcare system

The use of artificial intelligence has been part of the measures emanating from the increased use of healthcare technologies in Saudi Arabia. The study by Aboalshamat., *et al*. (2022) [6] elaborated on the importance of the healthcare technologies in promoting the diagnosis, preventive and intervention-based care in Saudi Arabia. The increased use of technologies has therefore been part of the measures influencing the changes and transformation within the healthcare system. The transformation emanates from the role of the technologies in creating new strategic ways of addressing the healthcare processes. The inclusion of information technologies has been consistent with the demand for having an effective way for working towards effectiveness in the healthcare process [18]. The focus would be to use the technological inputs to manage healthcare gaps, while addressing the requirements towards having an effective strategy for actualizing the healthcare system goals of quality outcomes.

The use of AI was identified as part of the contemporary technologies that has been influencing the changes in the healthcare sector. According to Saeed., *et al*. 2023, the use of AI focuses on building the capacity for improved inputs towards healthcare decisions. The AI concepts can improve the precision on the respective healthcare processes, which is an important factor when evaluating the implications on the healthcare processes. Such concepts include machine learning, Internet of Things and the application of robotics in healthcare [19]. With such inputs, the aim has been to provide the complementary inputs towards promoting reliability in addressing the healthcare needs. The improvement in capacity for decision making was also linked to the ability to use the information systems developed to help sustain the healthcare systems [18]. The AI use has therefore been part of the measures towards the improvement in the healthcare processes, which would influence the success of the healthcare systems.

The implementation of the AI system has been an influencer of its prevalence within the different healthcare systems. Studies by Alghamdi and Alashban, (2023) [9] and Amin and Alanzi, (2024) elaborated on the requirements for AI systems. Such requirements included the presence of technological infrastructure, information systems and resources that would help

accommodate the actualization of the AI systems. The investments in these requirements have remained a determinant when it comes to the identification of the requirements for having successful AI actualization for the organizations. The study by AlJarallah, (2023) indicated on the policy factor, which has an implication on the prevalence of the AI systems. Countries focus on the creation of regulations, which would enable the management of the technological approaches that can help influence the healthcare processes. The regulations have therefore focused on the need to generate the quality needs, which would be instrumental in addressing the required inputs for healthcare management processes.

Link between the use of artificial intelligence in healthcare and disease management in Saudi Arabia

Disease management is at the core of developing an effective healthcare system. According to Siontis., *et al*. (2021), disease management determines the ability to create and build a system that can handle the occurrence of diseases within the healthcare systems. The systems should accommodate the requirements for sustaining the quality of care, which is based on the capacity to address the diseases. The effectiveness of the healthcare systems would be evaluated based on the presence of consistent measures that can help address the existing disease burden. The studies by Alanzi., *et al*. 2023; Alqudaihi., *et al*. 2021 and Yu., *et al*. 2022 elaborated on the need for the healthcare management processes to accommodate the respective technologies to help boost the management inputs. The studies revealed on the important role that the AI systems have when it comes to the management of the healthcare needs. Such needs included the need for utilizing the required disease management processes, which would enable the realization of the goals within the healthcare systems, in terms of addressing the diseases.

The use of artificial intelligence enables the inclusion of technologies and systems that can help in building the capacities for disease management. The study by Saeed., *et al*. (2023) has focused on the determination of the need for technological processes, when it comes to addressing the procedure for sustaining the healthcare processes. The technological process includes the use of AI, as part of influencing the decision-making processes for addressing the disease management processes [18]. The integration of AI in the disease management process has been linked to the ability to address the processes for diagnosis and management of the specific conditions.

The disease management process was also linked to the capacity created, when it comes to developing solutions for the specific healthcare needs. The study by Rabaan., *et al*. 2022 indicated the role of the AI processes when it comes to diseases should be developed towards promoting patient care. The patient care concepts are targeted towards the realization of the specific interventions that would help meet the patient needs. The focus on the conceptualization of healthcare models based on AI was identified as a source of solutions for most of the diseases. Siontis., *et al*. 2021 recognized the creation of models that integrated both the artificial and human intelligence, as part of the critical measures that can be used to address the disease management within the healthcare systems. Such approaches would help boost the ability to address the disease management needs.

In the implementation of AI, studies by Alghamdi and Alashban 2023; Almazroi., *et al*. 2022 and Saeed., *et al*. 2023 focused on the advancements in healthcare delivery systems. These systems have included remote based system, which have been instrumental in addressing the requirements for managing the existing diseases. The ability to address continuous monitoring for patients has therefore been considered as one of the main benefits emanating from the use of AI. The aim would be to invest in a system that targets the patients' needs which can help boost monitoring as a source of meeting the effective healthcare needs [19]. The disease management approach is therefore relevant for addressing chronic diseases, which has been critical in ensuring the healthcare systems can address the requirements for sustaining quality of outcomes.

Best practices that would ensure the use of artificial intelligence in disease management in Saudi Arabia

The need for disease management is part of the goals that the healthcare systems have. The use of AI can have different implications on the disease management process. According to Alghamdi and Alashban 2023, the creation of the strategic processes for addressing the disease management should consider the security aspects. All information and technological systems have vulnerabilities, which can affect the data privacy and security

needs. Such factors are part of the influencers of the strategic processes that can help in attaining the expected reliability on the system. The policy development approach should be part of the determinants of the disease management process that would help incorporate AI in the healthcare processes [20]. The healthcare policy at the national and facility level should be based in ethical use of the system, which can help attain the quality outcomes expected.

The other consideration that comes with the implementation of AI in disease management emanates from the capacity factor. Studies by Rajpurkar., *et al*. 2022 and Yu., *et al*. 2022 focused on the need for infrastructure and resource development in the development of AI. The infrastructure focuses in the creation of the strategic processes that can help address the technological needs for AI. The resource factor focuses on the creation of a procedure that can help in generating the skills and qualities that can be used to attain the AI implementation [18]. The main gaps come in the investments, especially in the public healthcare systems. The actualization of the AI in disease management should focus on the gradual and consistent investments on matters relating to the AI resource and infrastructure.

One of the main issues affecting the use of AI comes from the public awareness and trust on the system and its role in the disease management processes [21]. The awareness and trust factors are related to the cultures within the societies on the role of technologies in healthcare. The focus would be on investments towards renes, as part of generating the trust on AI use. In such cases, the collaborative approaches between human and artificial intelligence would be incorporated into the healthcare delivery system [20]. The aim would be to have a strategic process for meeting the quality needs, while using AI as a source if improving the processes involved in disease management.

In the vision 2030, Saudi Arabia has focused on the investments towards healthcare transformation and the use of technologies [19]. The focus should be on the empowerments approaches that would guide facilities towards accommodating AI as part of the measures that can boost disease management. Any factors and aspects that would influence the management and improvement in disease management would be tailored to meet the goals in the vision 2030 and the popularity health needs [19]. Such factors would influence the ability to regulate the use of AI and boost its role in improving disease management.

Limitations of the Study

The study had several limitations, which has implications on its development and actualization. The first limitation came in the use of existing literature sources, which comes with the systematic review approach. The approach limited the access to the current views and status of the research topic, which was a limitation on the current research. The other limitation came in the article selection criteria, which was limited in the inclusion an exclusion criteria. Although the criteria were developed to help promote objectivity, it limited the number of articles that would provide data for the review.

Conclusion

The systematic review utilized 13 articles that met the inclusion and exclusion criteria, which guided the systematic review. The main findings indicated that AI can be used as a source of improving the disease management processes within the healthcare system. Disease management is an important process that is influencing the requirements to develop and sustain an effective healthcare system in Saudi Arabia. Disease management would enable the creation of effective measures towards address the specific diseases and their needs. The implementation of AI would be one of the ways that would help in actualizing the strategic approaches, when it comes to assessing and managing the disease. AI was found to have implications on the decision-making processes and the procedures involved in addressing the organizational requirements to manage the diseases. The actualization of the healthcare quality processes through AI would capitalize on the improvement in precision and the ability to manage the occurrence of errors. The main issues identified came from the need to have capacity and resource development to help align with the disease requirements, based on the AI applications. The need for investments towards AI actualization therefore remains a consistent factor that can influence and determine the procedures for actualizing the disease management needs.

Recommendations

The recommendations identified from the review are as follows:

- The government should develop a policy that would enable a balance between the implementation of the AI systems

and the ability to meet the regulations, such as privacy and security, to ensure its actualization in the healthcare system. The aim would be to increase the utilization of AI systems, based on the benefits.

- There should be investments into the capacity and the resource factors, given the need to capitalize in the benefits that come with the AI in ensuring access to the required inputs that can sustain the disease management processes. The investments should also focus on boosting the community awareness on the use of AI, since it would help boost trust amongst the population. The aim is to ensure that the AI utilization can be related to the disease management processes in the country.
- For future research, the focus should be on the procedures and strategies that can help balance the use of AI and human inputs, given the risks that AI poses on human capital and its role in addressing the various healthcare needs.

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