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Research article

Application of Expert Systems with Artificial Intelligence in the Medical Field: A Literature Review

John Eric G. Ramirez[1], Mark Kenneth A. Valerio[2], Joshua R. Layug[3], Cereneo S. Santiago Jr[4]*, Ma. Leah P. Ulanday[5], and Jared E. Alabanza[6]

[1] Department of Information Technology, Cavite State Univeristy – Silang Campus, Silang, Cavite, Philippines
[2] Department of Information Technology, Cavite State Univeristy – Silang Campus, Silang, Cavite, Philippines
[3] Department of Information Technology, Cavite State Univeristy – Silang Campus, Silang, Cavite, Philippines
[4] Department of Information Technology, Cavite State Univeristy – Silang Campus, Silang, Cavite, Philippines
[5] Department of Information Technology, Cavite State Univeristy – Silang Campus, Silang, Cavite, Philippines
[6] Department of Information Technology, Cavite State Univeristy – Silang Campus, Silang, Cavite, Philippines
* Correspondence: cssantiago@cvsu.edu.ph

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Abstract: Artificial intelligence (AI) has made enormous progress in recent decades, significantly influencing various industries, including the medical field. An expert system is a type of artificial intelligence that deliver specialized services in addition to experts by gathering specialty knowledge and expert information in a specific field. In light of the swift rise of Internet technology, the way expert systems are created and supplied has changed. The study used Google Scholar as the online database that provides published content about expert systems that apply AI in the medical field and covers the period of 2019 to 2024 to collect the latest data. The influence and effectiveness of utilizing an expert system with AI across various specializations are emphasized in this study's analysis of their uses in medicine. By using expert systems, they can mimic the decision-making of a human expert, improving healthcare results. Several medical specialties, including gynecology, neurology, orthopedics, ophthalmology, and cardiology, use these solutions based on AI. However, every field has its own set of difficulties, and technological developments are impacting the accuracy and reliability of diagnosis, especially gynecological diseases, which are more complex and diverse. Despite the difficulties, expert systems with AI can provide innovative solutions that can improve patient care. Understanding how AI works can pave the way for future innovation and progress in medical technologies, creating better patient results and more efficient healthcare systems. Educating medical personnel about AI and its applications could help them use these tools more efficiently to provide better patient care.

Keywords: Artificial intelligence; Expert system; Medical gield; AI in medical field; AI in healthcare

1. Introduction

The field of artificial intelligence (AI) is one of the most dynamic and transformational technologies. AI has advanced significantly over the last few decades, transforming several sectors and daily activities. AI has a vast and widespread impact on everything from self-driving cars and sophisticated medical diagnostics to personalized shopping experiences and targeted marketing strategies. AI integration has generated a lot of attention and conversation in the broad field of medicine. Using expert systems, computer

programs are created to simulate human decision-making in particular fields, one of the areas with a specific focus. AI-supported technologies significantly improve physicians' diagnostic and treatment decision-making processes by learning and diagnosing from vast medical research and patient treatment records. Realizing that while the digital medical revolution began sooner than in other industries, it has progressed more slowly. The rapid development of science, technology, and the economy has made medical care a significant topic of interest for individuals, groups, and even the country as a whole [1]. Through their diagnosis and treatment processes, the expert system and experts' combination have proven reliable and efficient [2]. Because of AI's potential to bring about revolutionary advances in treating human diseases and public health, researchers, doctors, technology and program developers, and consumers in various disciplines have expressed interest in the technology [3]. While expert system consultations are an excellent tool, many aspects, such as patient preferences, can only partially be provided by the systems and must still be validated by human experts.

Medicine is a broad field that consists of different areas of expertise, which also states the possibility of a considerable number of gaps when artificial intelligence and expert systems are implemented. As every expert has a different implementation, these individuals should be knowledgeable if they need a glimpse of how it is integrated. As AI becomes more widely used in healthcare, medical students, residents, fellows, and practicing physicians must be knowledgeable in data sciences, AI, ethics, and legal considerations, for they will have to be covered in the curriculum of medical schools [4]. In addition, Chan and Zary [5] stated that AI was primarily used in medical education for learning support because of its capacity to offer personalized feedback. Due to the lack of digitalization and the delicate nature of exams, there needed to be more focus on curriculum improvement. By tackling the technical challenges of developing an AI application and utilizing cutting-edge techniques to evaluate the efficacy of AI, methodological advancements are needed to boost AI adoption. For medical practitioners to better comprehend AI algorithms and make the most of them, steps should be taken to incorporate AI into the curriculum of medical schools [5]. The result of integrating AI into their job could be the reason medical practitioners are worried about adding AI to the curriculum. Paranjape et al. [4] stated that it will be challenging to integrate AI into standard clinical practice as it becomes more prevalent in healthcare. Along with altering the traditional methods by which doctors practice medicine. The goal of AI is not to eliminate physician involvement but rather to concentrate their skills on areas where they are most important and on tasks that robots cannot and may never perform [6].

This literature review aims to supply sufficient information that could benefit studies in the medical field about the effects of applying an expert system with artificial intelligence. The process was done by systematically and critically reviewing the literature from 2019 to March 2024. Previous studies provide information on implementing an expert system with artificial intelligence in the medical field. The results of this study should provide researchers and healthcare professionals with fresh perspectives on the extent of the potential of new technologies and applications, particularly AI, in their operations and care delivery [3]. Hence, this paper examined the possible effects of applying an expert system with artificial intelligence in the medical field and its relevance and challenges.

2. The Review Methods

The systematic review followed six steps for conducting such reviews after Durach et al. [7]. The specific procedures are listed below:

2.1 The Design

By conducting a literature review, six guidelines were followed to form this review properly. First, the research question was clearly defined to establish the focus and scope of the review. Next, the necessary attributes critical to addressing the research question were identified, helping to narrow down the relevant materials. A comprehensive search was conducted to gather potentially relevant sources from databases and repositories. These materials were then critically evaluated to select the most appropriate and credible literature for inclusion. The pertinent data and themes from the chosen sources were compiled and organized to provide meaningful insights. Finally, the review's findings were presented, summarizing the key insights and highlighting their relevance to the research question.

2.2 Research Objectives

The review addressed the research question: "What are the impacts of Expert Systems with Artificial Intelligence on the medical field?". The following objectives guide the review: (1) to identify the relevance of Expert Systems with Artificial Intelligence to the medical field, (2) to synthesize their effectiveness in improving performance, and (3) to analyze the challenges they face in enhancing performance.

2.3 Retrieving and Selecting Pertinent Literature

The review uses reliable and trustworthy online databases that provide published content about expert systems that apply artificial intelligence in the medical field. "Expert System with Artificial Intelligence in the Medical Field" is the search term for online databases. All in all, 225 articles were discovered by the search. There were 10 IEEE publications, 68 Science Direct results, 8 MDPI results, and three articles from papers SSRN that were located. After the documents were screened using the criteria that the article had an expert system or artificial intelligence in the medical sector, 71 articles were eventually found. As a result, reading the complete texts and evaluating each piece was part of the screening process, which produced 22 finished articles.

2.4 Synthesizing the Literature

The studies were published between 2019 to March 2024. A total of 22 articles were selected to suit the purpose of this review. The data from the paper is extracted, and the primary study findings are analyzed and integrated into Table 1.

Table 1. Table Synthesis.

Author	Relevance	Effectiveness	Challenges
Bowness J., Morse R., Lewis O., Lloyd J., Laurent D., Bellew B., Macfarlane A., Pawa A., Taylor A., Noble J., Higham H. (2023) [8]	Comprehensive objective and quantitative evaluation of ultrasound images connected to regional anesthesia through human experts and AI systems.	Instability has been recognized by human experts in the identification of anatomical structures, which are the core structures for spotting the block view on relevant nerve blocks.	Expert participants complained that some images were difficult to comprehend, and data entries that were not stated were included in the analysis.
Halfon, P., Penaranda, G., Ringwald, D., Retornaz, F., Boissel, N., Bodard, S., Feryn, J. M., Bensoussan, D., & Cacoub, P. (2024) [9]	To help medical practitioners administer suitable tests for investigating different types of anemia.	The expert system's recommendations do not align with the laboratory tests done in real-life settings for investigating anemia.	Some recommended tests that were unnecessary for every variant of anemia were stated.
Khanagar, S. B., Al-Ehaideb, A., Maganur, P. C., Vishwanathaiah, S., Patil, S., Baeshen, H. A., Sarode, S. C., & Bhandi, S. [10]	In dentistry, AI is used to make diagnosis accurate and efficient, which is important to achieve the best treatment results alongside the utmost quality patient care.	It has brought great value through improvement in the accuracy of diagnosis, enhancement of clinical decision-making, and prediction treatments for the best quality care to patients.	Much information is needed to analyze the patients' problems accurately.
Araújo, V. S., Guimarães, A., De Campos Souza, P., Rezende, T. S., & Araújo, V. S. [11]	A hybrid model specialist system with a high degree of interpretability in detection and accuracy in predicting breast cancer through the extraction of information to a database that uses fuzzy rules.	A significant increase in accuracy, sensitivity, and specification.	The complexity of the database made it problematic to work with.

Table 1. Table Synthesis. (continue)

Author	Relevance	Effectiveness	Challenges
Rabaan, A. A., Bakhrebah, M. A., Alotaibi, J., Natto, Z. S., Alkhaibari, R. S., Alawad, E., Alshammari, H. M., Alwarthan, S., Alhajri, M., Almogbel, M. S., Aljohani, M. H., Alofi, F. S., Alharbi, N., Al-Adsani, W., Alsulaiman, A. M., Aldali, J., Ibrahim, F. A., Almaghrabi, R. S., Al-Omari, A., & Garout, M. (2023) [12]	The common application of AI in healthcare is a prediction of treatment protocols aligned with the patient's characteristics and treatment perspective.	Diagnosing infectious diseases in collaboration with AI and medical data could give more accurate and specific results with efficient execution, which helps healthcare professionals treat sick individuals at a significant time and also helps to reduce the risk of infection.	The inability of AI to assist in biological research involves extracting verified information from a database and combining it to build comprehensive knowledge for filling out missing details.
El-Habibi M., Megdad M., Al-Qadi M., AlQatrawi M., Sababa R., Abu-Naser S. (2022) [13]	Patients are assisted in determining the type of disease they have, its symptoms, and the most effective treatment method by using the expert system.	Medical students evaluated the expert system, and they found it to be satisfactory. Moreover, the system can benefit individuals with reproductive issues, recent grads, obstetricians, and gynecologists.	The majority of technologies are still in the development stage. Thus, it isn't easy to guarantee the precision and dependability of the diagnostic advice, given the complexity and variability of gynecological conditions.
Melina, N., Putra, E. K., Witanti, W., Sukrido, N., & Kusumaningtyas, V. A. (2020) [14]	The system integrates a health expert's knowledge to aid decision-making, enabling it to identify diseases and offer treatments for related problems.	The fundamental idea of multi-knowledge was used in creating the expert system to store a large amount of knowledge regarding diseases from numerous experts. Because it uses the SQL inference method, the expert system may be accessed more quickly and is updated dynamically.	Herbal medicine is a complex field encompassing an extensive range of herbs, each having unique effects, interactions, and traditional knowledge bases. Due to this diversity, it is challenging to standardize data and guarantee the precision of the expert system's recommendations.

Table 1. Table Synthesis. (continue)

Author	Relevance	Effectiveness	Challenges
Sumiati, Hoga ,Saragih, Rahman, Triayudi (2021) [15]	This research aims to develop software or a system that can identify cardiac abnormalities in place of a doctor using an expert system.	The outcome of the certainty factor value that the expert system with an expert produced for the normal heart and the abnormal heart was 95% accuracy for the former and 99% accuracy for the latter.	With the intricacy of diagnosing heart illness, one of the challenges is assuring accuracy and reliability in interpreting electrocardiogram (ECG) data.
Al-Hajji, A. A., AlSuhaibani, F. M., & AlHarbi, N. S. (2019) [16]	The system assists medical professionals, including psychologists, diagnose a patient's condition swiftly and precisely.	The proposed expert system is an essential tool to help the doctor make a diagnosis. The system is also beneficial for patients who cannot pay or do not have access to a psychologist in their neighborhood.	Ensuring the system's diagnostic features are accurate and dependable is one of the challenges. A thorough understanding of a patient's symptoms, habits, and personal history is often required while treating psychiatric illnesses.
Yadav, A. K., Shukla, R., & Singh, T. R. (2021) [17]	Expert systems have been applied in various IoT and healthcare domains, including cancer, AD, and cardiovascular disease detection, due to the quick advancement of AI approaches.	Expert systems provide recommendations to doctors and subject matter experts to help them become more proficient and to raise the standard and consistency of their diagnoses. Additionally, the expert system lowers costs, maintains consistency, dependability, and diagnosis speed, and enhances decision quality.	The consistency and quality of healthcare data are among the main problems. Large, high-quality datasets are necessary for machine learning algorithms to learn and produce precise predictions.
Huang, S., Yang, J., Fong, S., & Zhao, Q. (2020) [18]	The benefits of AI for cancer diagnosis and prognosis are outlined in this article's literature evaluation. We examine how AI improves cancer detection and prognosis, particularly in light of its remarkable accuracy.	AI has more room for growth and opportunity, and its skills will progress beyond what they currently provide.	Medical imaging data cannot be directly used as input data for cancer diagnosis and prognosis using artificial intelligence (AI) technology.

Table 1. Table Synthesis. (continue)

Author	Relevance	Effectiveness	Challenges
Salem, H., Soria, D., Lund, J. N., & Awwad, A. (2021) [19]	The group of scientists in academic units promotes using expert systems in clinical urological research.	The difficulty of the development would make it difficult for urology clinics to adopt them, and the lack of statistical tools in the field creates a gap for future studies.	It is common to test a hypothesis for the "factors-outcome effect"; however, due to the standard regression analysis tools that are proven ineffective, it became useless with its noisy variables.
Saibene, A., Assale, M., & Giltri, M. (2021) [2]	The application of a medical expert system gives patients and physicians instantaneous knowledge.	The ability to support substitute experts for medical diagnoses, the expert system could be an excellent tool to help them with medical diagnoses.	The issue of medical diagnosis is complicated and affected by different factors. This matter could reflect the interpretation of many kinds of information.
Chumachenko, D., Balitskii, V., Chumachenko, T., Макарова, В. И., & Railian, M. (2019) [20]	The end goal of an expert system is to build computer systems that can make choices based on experts. ' decisions.	Creating a web application with a software package will likely remove information gaps and other issues.	Evaluating the level of hygiene of nurses of various medical facilities and understanding the protocols in medical procedures.
Athota, L., Shukla, V. K., Pandey, N., & Rana, A. (2020) [21]	They developed a medical chatbot that uses artificial intelligence to diagnose the disease and provide information.	A program designed to give quality answers quickly removes unnecessary action and provides the user with the answer.	The chatbot could not understand the questions and needed a third-party expert system to process them.
Haug, C., & Drazen, J. M. (2023) [22]	Medical applications of AI and machine learning have entered the medical field, such as helping to recognize infectious diseases and outbreaks that could relate to public health.	The system will enable health professionals to do their duties and give them social interactions that make medicine more rewarding.	More difficulties are introduced and must be dealt with in the protocols and reporting in clinical studies while using AI and machine-learning applications.

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Author	Relevance	Effectiveness	Challenges
Mansour, R., F., Amraoui, A., E., Nouaouri, I., Diaz, V., G., Gupta, D., & Kumar, S. (2021) [23]	The traditional healthcare system has been upgraded and made more convenient by integrating the Internet of Things (IoT) and AI, turning it into an intelligent healthcare system.	Using AI's analytical capability and IoT's real-time data collection capabilities has been shown to reduce complexity and enhance disease detection.	The communication of personal health information over IoT networks presents challenges to data security and privacy.
Sun, L., Jiang, Xin., Ren, H., & Guo, Y. (2020) [1]	Improve healthcare services using scalable cloud infrastructure, low-latency analytics, and real-time data processing.	AI in edge and cloud computing for the Internet of Medical Things (IoMT) allows for scalable telemedicine solutions, quick diagnosis, and ongoing patient monitoring, all of which enhance patient care and operational effectiveness.	The security of medical data and the confidentiality of patient information are at risk, and high energy usage presents another significant challenge.
Ali, O., Abdelbaki, W., Shrestha, A., Elbaşi, E., Alryalat, M. a. A., & Dwivedi, Y. K. (2023) [24]	AI technologies such as machine learning, the Internet of Things (IoT), and algorithms monitor, diagnose, and measure risks and benefits to provide quality health services.	AI, alongside its subareas, has significantly benefited individuals, the healthcare sector, and organizations.	Careful evaluation of data integration, privacy issues, legal issues, and patient safety is the utmost priority due to the strict regulations in the healthcare industry.
Alowais, S. A., Alghamdi, S. S., Alsuhebany, N., Alqahtani, T., Alshaya, A., Almohareb, S. N., Aldairem, A., Alrashed, M., Saleh, K. B., Badreldin, H. A., Yami, M. S. A., Harbi, S. A., & Albekairy, A. (2023) [25]	AI in healthcare is used to develop diagnostic tools and suitable treatment plans, which will help revolutionize healthcare services.	Tools of AI can handle large datasets crucial for identifying patterns; this allows improvement in diagnosing diseases, treatment selection, and laboratory testing to increase accuracy and work efficiently while minimizing human errors.	Problems associated with data privacy, bias, and the requirement for human expertise must be dealt with to implement AI effectively and responsibly in healthcare.

Table 1. Table Synthesis. (continue)

Author	Relevance	Effectiveness	Challenges
Richardson, J. W., Smith, C., Curtis, S., Watson, S. E., Zhu, X., Barry, B. A., & Sharp, R. R. (2021) [26]	The use of AI has expanded and has been successful in creating chatbot image analysis and diagnostic tools.	Utilizing large amounts of clinical data and its processing ability, AI in the medical field supports evidence-based decision-making, and it raises issues with ethics in the transparency of data use.	The patients worry that if the technology advances more, the cost will increase as well.
Amann, J., Blasimme, A., Frey, D., & Madai, V. I. (2020) [27]	Artificial intelligence sometimes comes in clinical decision support systems, frequently used to help doctors diagnose patients and make treatment decisions.	The expert AI system cannot provide accuracy due to errors from different sources.	The widely discussed requirement for the AI system is clinical validation.

3. Discussion

3.1 Relevance of Expert Systems with Artificial Intelligence in the medical field.

Integrating Expert Systems with Artificial Intelligence (AI) in the field has remarkably advanced healthcare delivery, illness diagnosis, treatment planning, and medical research. These expert systems, designed to mimic the decision-making skills of a human expert with a broad amount of medical data, can assist in diagnosing the patient's illnesses, then creating a treatment plan for them, and patient management. Expert Systems with AI can analyze complex medical records, imaging data, and genetic information to identify patterns and suggest diagnoses that human clinicians may overlook. Their capacity is exceptionally valuable, especially in detecting rare diseases and subtle abnormalities in patients. The systems facilitate personalized medicine that tailors the patients' treatment plans based on their unique genetics, lifestyle, and medical history, leading to more effective therapy. It can also support clinical decisions by providing evidence-based recommendations and predicting patient results, which is crucial in managing chronic conditions and long-term planning for patient care.

The selected studies demonstrate that AI and expert systems are frequently applied in today's healthcare. Expert systems often use AI tools, especially machine learning and neural networks, to mimic human expert decision-making and improve healthcare results. Using an expert system with AI in the fight against infectious illnesses is one of the topics in the literature. According to Tkatek et al. [28], AI can be important for public health by offering data-driven insights to stop the spread of such diseases. This suggests that future public health policies should include AI-based systems, which have implications for how governments and public health organizations may take control of the management of pandemics. Bowness et al. [8] have discovered that AI can supplement human skills for highly specialized activities. This approach proposes that AI improves accuracy and consistency, lowering the variables of diagnostic outcomes and resulting in better patient care. The use of expert systems in medical diagnostics highlights the significance of using AI to help decipher some of the complicated medical data.

Similarly, Halfon et al. [9] show that expert systems can help doctors choose suitable tests to diagnose anemia. In dentistry, Khanagar et al. [10] AI can also help in precise decision-making, which can significantly help patients by ensuring accurate and swift diagnosis. These systems have also branched into a supporting role in psychiatry [16], demonstrating how artificial intelligence can leverage mental health providers to develop scalable and trustworthy diagnostic tools. Moreover, Salem et al. [19] call for expert systems in urological research, pointing to their potential role in filling the gaps between clinical urological diagnostic and research. These articles illustrate AI's positive impact on healthcare by bringing technologies to improve medical decision-making and patient care in various disciplines.

Furthermore, Araújo et al. [11] also looked at the role of AI in creating personalized healthcare. They demonstrated how AI-based expert systems could help with the detection of early diseases and the creation of customized treatments. Results show the broader understanding AI can offer, which is crucial for modern healthcare.

3.2 Effectiveness of Expert Systems with Artificial Intelligence in improving performance in the medical field.

In the medical field, AI has various applications that alter its effectiveness. Almost every part of the human body has a specific expert physician. Neurologist, Ophthalmologist, Neurologist, and Orthopedist, to name a few. There are also other sectors, such as Physical therapists, radiologists, Medical technologists, and so on. These areas of medicine have different applications of AI and numerous ways of implementing it. According to Lee and Yoon [3], AI offers a huge and diverse range of applications, from basic operational process innovation to the most advanced patient care for emergencies. This broad application is good since it solves, if not diagnoses, many illnesses, which is a big help for physicians in giving proper treatments.

The widespread adoption of AI-enabled technology in healthcare settings enhances the treatment standard and maximizes medical resource use [3]. To support this, hospitals serving 500,000 people in

southeast England gave their fitted discharged patients a Wi-Fi-enabled armband that monitors their vital signs. This real-time patient data monitoring resulted in a notable decrease in readmission rates and emergency room visits. The need for expensive home visits was reduced by 22%, and the adherence to treatment plans, compared to the industry's average of 50%, was increased to 96%. In addition, a public hospital in Atlanta, USA, reported a savings of $4 million due to the 31% reduced readmission rate with the help of an AI-enabled tool that identifies "at risk" patients [3]. However, the result of AI applications does not only lean on the good side as some concerns are raised, such as privacy of records, safety and reliability, ethical issues, and responsibility for failure. This leads to the thought that a part of society rejects AI integration in the medical field. Jiang et al. [29] stated that AI's advancement has been hampered by the difficulties of machine learning, the flaws in ethics and legal frameworks, and society's lack of acceptance.

Moreover, ethical concerns are significant given the nature of healthcare services since AI technology can potentially jeopardize patient privacy, safety, and preferences. The speed of advancements in AI is currently outpacing policies and ethical requirements for healthcare services that use AI and its applications [30]. The effectiveness of AI relies on how the recipients or benefactors see it, whether it is good or bad. This innovation is suitable for medical practitioners because it serves as an instrument for them to improve their crafts and services. Then again, it is the opposite for some ordinary citizens since they are exploring what is unknown and uncertain. It is very understandable since little information is doubtful and challenging to trust. The acceptance of AI in the medical field is essential for the future of medical science and treatment.

Many have found expert systems successful in providing accurate diagnosis, distributing operation efficiency, and improving patient outcomes. According to Khanagar et al. [10]**,** AI has improved diagnostic precision in dentistry by facilitating the assessment of clinical information, thus assisting improved clinical decision-making. Furthermore, Amann [27] reminded us that in numerous fields of medicine, clinical decision support systems using clinical data enable researchers to provide evidence-based recommendations, which could enhance our diagnostic accuracy. Besides, according to Richardson [26]**,** AI can analyze vast amounts of clinical data, enabling evidence-based decision-making and providing more consistent patient outcomes. However, According to Alowais et al. [25], for AI systems to succeed in healthcare, the system needs to systematize a large amount of this data very effectively to identify diagnostic patterns, facilitate treatment selection, and reduce errors. These successes aside, the studies as a whole signal that while current AI systems can make a real difference in medicine, their effectiveness varies based on data quality and the target application of the system.

3.3 Challenges of Expert Systems with Artificial Intelligence in improving performance in the medical field.

Medical technology still faces several obstacles in many different areas. There are unknown possibilities and complications brought about by AI and machine learning, which makes protocol modifications in clinical trials and data security issues across networks necessary. A study by Chua et al. [30] stated that healthcare data inconsistencies and quality problems hinder the machine learning algorithm from producing an accurate prediction. This difficulty of medical diagnosis is increased by having the information and its analysis. Ala and Chen [31] emphasized that gynecological disorders are challenging to establish diagnostic precision because of their complexity and variability, making it difficult to guarantee the assurance of medical technologies. In addition, Serhani et al. [32] highlighted the continuous challenges of ensuring accuracy and dependability using electrocardiogram data for diagnosing heart disease. Specific challenges could best the technology and the expert system by making a specified solution. Long et al. [33] indicate that the diversity within herbal medicine makes standardization efforts more difficult and affects the accuracy of expert systems' results. Differences in every location could affect and complicate the expert system's decision-making. Standard statistical regression analysis tools are compromised by noise contamination in data, especially when evaluating hypotheses. They assess the nurses' knowledge of cleanliness rules and use outside expert systems to address unclear questions and present challenges. Risks to confidentiality, energy use, data integration, privacy, legal issues, bias, and the requirement for human expertise highlight the complex issues that face the application of AI in healthcare. Knowing this could help apply artificial intelligence in the medical field since it could create significant opportunities and further advancements with lower risk than earlier

studies. Furthermore, while these results may help direct current and future research towards highly efficient and low possible failure, many medical professions have considerable challenges similar to the studies that could help their development. Even more significant and prominent are the technical challenges, like the requirement for ongoing clinical testing of systems, and clinical decision support systems must be continually validated over time to remain correct as medical knowledge changes [34]. In terms of medical diagnosis in gynecology, it appears to have an intricate nature, which creates further challenges to normalizing AI-guided advice.

4. Conclusions

Integrating expert systems with artificial intelligence into the medical field represents a transformative advancement with complicated implications. AI technologies, such as machine learning and neural networks, are devices that can mimic human decision-making processes to enhance diagnostic accuracy, treatment customization, and healthcare efficiency. These advancements are particularly crucial in approaching the topic of infectious diseases, improving early detection, and optimizing medical resource allocation, as evidenced by many studies. However, significant challenges accompany the effectiveness of AI in healthcare; its concerns over privacy, ethical implications, and the need for robust regulatory frameworks continue to exist. Moreover, technical challenges, including data quality issues and the complexity of medical diagnostics, underscore the necessity for continuous refinement and adaptation of AI-dependent systems. Despite these challenges, AI remains an effective tool for medical practitioners, offering decision support that enhances their capabilities rather than replacing them outright. The ongoing research and development in AI promise further innovations that could revolutionize patient care and health outcomes globally. Therefore, navigating these complexities while leveraging AI's potential is essential for realizing its full benefits in modern healthcare. As AI continues to evolve, its integration into medical practice holds opportunities for more accurate diagnoses, personalized treatments, and improved patient outcomes in the future.

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