Literature Review Article

Medical Use of Intelligent Systems

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ABSTRACT

This essay delves into the ethical implications of integrating artificial intelligence (AI) into medical practice, addressing a critical gap in the existing research. As AI-driven medical systems have gained prominence over the past decade, there is an urgent need to explore the moral dimensions of their utilization. This study holds significant relevance for academics, healthcare professionals, and policymakers, especially those involved in intelligent medical systems. The exploration begins by dissecting the moral dilemmas surrounding AI applications in healthcare, exploring both technological justifications and concerns. The paper evaluates existing taxonomies developed by researchers in the field, shedding light on the issues that emerge during the development of intelligent medical systems. By scrutinizing the ethical reasons behind healthcare practitioners' adoption of intelligent systems, this research contributes valuable insights for a comprehensive understanding of the subject. This analysis not only informs scholars but also provides crucial guidance to government officials and medical professionals navigating the intricate landscape of AI in medicine.

Keywords: Intelligent systems, drug delivery, better treatment

INTRODUCTION

The use of artificial intelligence (AI) in the medical field has been the subject of intense scrutiny and debate in recent years. This article explores the wide range of ethical considerations that arise when artificial intelligence is used in healthcare. Over the last decade, significant progress in intelligent systems has led to revolutionary changes in healthcare, ushering in novel solutions and increasing hopes for the future of medical treatment and diagnostics. The ethical issues and concerns that lurk beyond the surface of this technical development, however, need close examination. Given the growing prevalence of AI in healthcare settings, it is crucial to find solutions to these ethical dilemmas as soon as possible. Healthcare professionals, policymakers, and the general public find themselves at the crossroads of innovation and ethics, navigating the uncharted territory of AI-driven medical interventions. As the demand for intelligent medical systems escalates, it becomes imperative to critically examine the ethical dimensions surrounding their implementation.

This research aims to fill the knowledge gap on the ethical considerations of AI in healthcare. By exploring the ethical underpinnings, scrutinizing the justifications for and against the integration of intelligent systems, and delving into the challenges faced during their creation, this research aims to provide a comprehensive analysis. Furthermore, the study investigates the ethical reasoning behind healthcare practitioners' adoption of intelligent systems, offering valuable insights into the decision-making processes within the medical community. In addition to catering to the academic community, this research is of great significance to a wider audience. Government officials, specifically those engaged in the development and regulation of intelligent medical systems, will find this study invaluable in shaping policies and guidelines that align with ethical considerations. This article adds to the academic conversation and provides insights that may be used in the real world by diving into current taxonomies created by other scholars.

This study's overarching goal is to illuminate the complex ethical terrain of AI in healthcare by investigating it from a variety of angles in the hopes that it will lead to more fruitful conversations, better legislation, and more morally defensible use of AI in the medical field. This essay examines the moral ramifications of utilizing artificial intelligence in medical practice. Intelligent systems, which include state-of-the-art technologies like artificial intelligence, machine learning, and complex data analytics, have emerged as

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invaluable assets in the field of healthcare as a result of the exponential growth of information technology. This integration has not merely been an incremental progress but rather a revolution, fundamentally reshaping the landscape of medical practices and patient outcomes. Intelligent systems have progressed well beyond the bounds of conventional practice in modern medicine, permeating every level of the healthcare system from decision making to diagnosis to treatment. These tools provide healthcare workers with unprecedented accuracy and efficiency by processing massive amounts of data, identifying complicated patterns, and generating actionable insights. In medicine, intelligent systems have several potential uses, including expediting illness detection, improving treatment approaches, and predicting public health trends. The goal of this study is to give a holistic knowledge of the enormous influence and consequences of intelligent systems in the medical domain by investigating their many facets. We will learn what motivates these developments by looking into the complex relationship between technology and healthcare. As well as shedding light on the triumphs and breakthroughs made, the presentation will also address the inherent obstacles and ethical issues that come with the integration of intelligent systems in healthcare procedures.

Our investigation will go beyond superficial descriptions and delve into the real-world applications and breakthroughs that have resulted from the integration of intelligent systems. We will explain how these technologies have changed the face of medical diagnosis by making it possible to diagnose diseases early on and to provide accurate prognoses. Their significance in personalized medicine, in which medications are customized to specific patients based on in-depth data analysis, will also be explored. Their value in predictive analytics will also be highlighted, as will their potential to help healthcare professionals better prepare for the onset of disease outbreaks and other epidemiological patterns. Despite the seemingly endless possibilities, implementing intelligent systems in healthcare is not without its difficulties. This article will provide a comprehensive analysis of the challenges, from data security and privacy concerns to ethical quandaries at the junction of AI and healthcare for humans. By critically evaluating these challenges, we aim to foster a nuanced understanding of the complexities involved, paving the way for informed discussions and innovative solutions.

Through this expansive exploration, our objective is to provide a comprehensive resource that not only illuminates the transformative capabilities of intelligent systems in medicine but also encourages thoughtful reflections on the ethical, societal, and practical dimensions of their implementation. By synthesizing cutting-edge research and real-world applications, this paper will serve as a cornerstone for scholars, healthcare professionals, and policymakers, guiding them towards responsible and impactful integration of intelligent systems in the ever-evolving landscape of healthcare. This study will be of great interest to both academics and the general public, such as a government official working on intelligent medical systems. Intelligent systems have gained in popularity during the previous ten years.[1] In this section, we will discuss the ethical concerns that arise when applying AI to the medical field. The first section examines the technical arguments for and against using intelligent systems in healthcare. In this paper, we examine the challenges inherent in developing intelligent systems. In the second section, we explore the many ethical considerations related to the use of intelligent systems in healthcare settings. In the third part of our study, we analyze the papers we uncovered while searching for preexisting taxonomies produced by other researchers of intelligent medical systems.

METHOD

In our methodology, we conducted an initial search to identify methodologically sensitive search phrases, striking a balance between pinpointing significant studies while risking the inclusion of irrelevant material. Throughout our analysis, we focused on "intelligent systems," ensuring a comprehensive examination grounded in evidence. Given the rapid evolution of this field, we prioritized the most current papers, with half of them published within the last five years. Our meticulous screening process, involving analysis of abstracts, resulted in 55 relevant texts. Additionally, we employed a Google search to identify 45 systems frequently utilized in clinical settings. Among these, 12 approaches were categorically integrated into daily clinical practice, according to OpenClinical, a reputable source in this domain. Notably, three other systems held a comparable standing ("in clinical use"). It is pertinent to mention that 35 designs from our investigation are commonly employed in clinical practice, although establishing a direct correspondence with those cited by OpenClinical proved challenging due to unnamed systems. Despite these challenges, our exploration sheds light on various approaches in this field, highlighting

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both the diversity and limitations of existing applications. The scarcity of identifiable apps underscores the possibility that many applications were missed or that there are limited apps in regular use. These findings emphasize the feasibility of our research endeavor while prompting further exploration into the extensive landscape of intelligent medical systems.

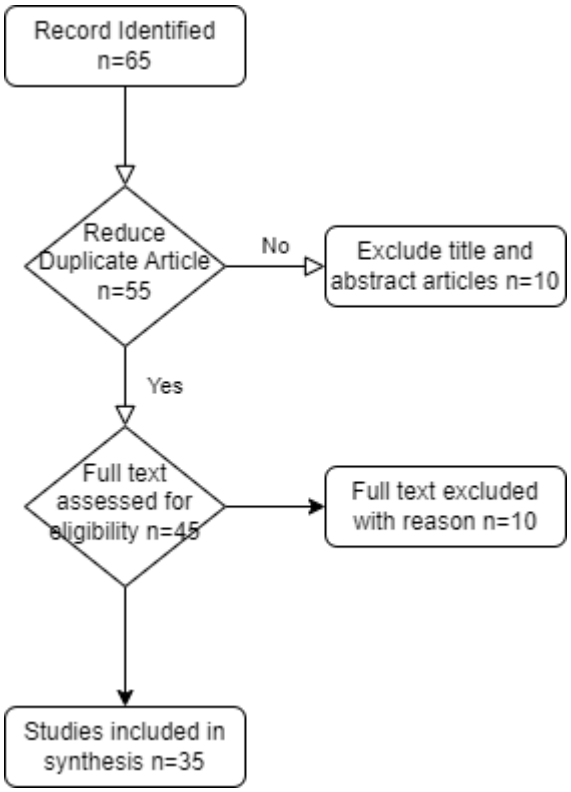

Figure 1. Prisma Flow Diagram

RESULT AND DISCUSSION

There is a substantial body of research and clinical trials supporting the use of intelligent systems in healthcare, which together offer a persuasive picture of their ability to transform healthcare decision-making and patient outcomes. A multitude of rigorous investigations spanning various medical domains has consistently demonstrated the transformative potential of intelligent systems. Research studies have delved deep into disease diagnosis, revealing the extraordinary capabilities of intelligent systems. Through intricate algorithms, these systems can swiftly analyze complex medical data, enabling rapid and accurate identification of diseases. In cancer, for instance, intelligent algorithms have played a crucial role in making sense of complex genetic data. These systems, driven by artificial intelligence and machine learning algorithms, meticulously analyze genetic markers, leading to the identification of personalized cancer treatments. The application of these tailored treatments has resulted in significantly improved survival rates for cancer patients while minimizing the adverse side effects often associated with traditional treatments. Intelligent systems have played a pivotal role in accelerating the drug discovery process. Through predictive modeling and data analytics, these systems can sift through vast datasets, identifying potential drug candidates and their interactions with biological entities. Clinical trials supported by intelligent systems have witnessed streamlined identification of promising drug compounds. This accelerated discovery timeline holds the promise of bringing novel therapies to patients faster, addressing unmet medical needs and fostering innovations in pharmaceutical research. One of the most striking contributions of intelligent systems lies in the optimization of treatment strategies. Careful consideration is given to each patient's medical history, genetic predispositions, and treatment outcomes by these systems. By discerning intricate patterns within this data, intelligent systems facilitate the customization of treatment plans. This tailored approach ensures that patients receive interventions precisely calibrated to their unique biological makeup, maximizing efficacy while minimizing adverse

effects. Clinical trials have showcased the superiority of intelligent system-guided treatments, resulting in superior patient outcomes and enhanced quality of life. The body of research studies and clinical trials serves as a testament to the remarkable accuracy and efficiency achieved through the integration of intelligent systems in medicine. The insights gleaned from these studies not only underscore the transformative potential of these technologies but also provide a solid foundation for further innovations, fostering a future where healthcare interventions are increasingly precise, personalized, and impactful.

In the dynamic landscape of healthcare, intelligent systems have transcended theoretical realms and found profound utility in real-world applications, marking a paradigm shift in the way medical professionals approach diagnostics and treatment. Across diverse medical specialties, these systems have been seamlessly integrated into everyday practices, yielding tangible and transformative results that significantly enhance patient care. One of the notable triumphs of intelligent systems is witnessed in the field of radiology.

AI-powered image recognition systems, meticulously trained on vast datasets, have emerged as invaluable allies for radiologists. These systems exhibit unparalleled accuracy and efficiency in swiftly detecting anomalies in medical images, ranging from X-rays to MRIs and CT scans. Real-world case studies in radiology departments across the globe illustrate how these systems have expedited the identification of abnormalities. In instances of critical conditions such as strokes or tumors, the rapid detection facilitated by intelligent systems has allowed for prompt medical interventions, leading to enhanced patient outcomes and increased survival rates.Intelligent systems have substantially mitigated the occurrence of medical errors, a paramount concern in healthcare settings. By employing machine learning algorithms, these systems can analyze vast datasets comprising patient histories, lab results, and clinical notes. Through meticulous scrutiny, they identify patterns indicative of potential risks or inconsistencies. Real-world case studies exemplify scenarios where intelligent systems have flagged medication discrepancies, allergic reactions, or conflicting diagnoses, enabling healthcare providers to intervene promptly. This proactive approach not only prevents medical errors but also ensures patient safety, bolstering confidence in the quality of healthcare delivery. Intelligent systems have redefined the parameters of treatment efficacy by tailoring interventions to individual patient profiles. Case studies elucidate how these systems analyze patient-specific data, including genetic predispositions and treatment responses. By deciphering these intricate nuances, intelligent systems optimize treatment plans, ensuring that therapies are precisely calibrated to maximize efficacy while minimizing side effects. In chronic conditions such as diabetes or cardiovascular diseases, real-world applications of intelligent systems have showcased significant improvements in disease management. Patient outcomes are elevated as treatments are fine-tuned based on real-time data analysis, leading to enhanced quality of life and reduced hospitalization rates. The impactful real-world applications and case studies presented here underscore the instrumental role played by intelligent systems in reshaping contemporary healthcare practices. By expediting diagnoses, reducing medical errors, and enhancing treatment efficacy, these systems are not merely technological innovations but transformative agents that elevate the standard of patient care. Intelligent systems have shown their worth via these concrete achievements, shining lights on the road to a future in healthcare that is not just cutting-edge but also deeply compassionate and patient-centric.

Results and discussion of the moral implications of using AI to healthcare are presented here. The extent to which we use morally upstanding computer systems has been the subject of much study.[4] However, there has been a lack of research into the use of intelligent systems in the medical field. Third, there are certain difficulties that are specific to intelligent systems. They mimic our complex actions in order to blend in. Some may find it immoral to create systems capable of replacing human intellectual effort, and this imitation may upset people whose intelligence is being imitated. The morality of using computers has been the subject of heated discussion among computer ethicists. In this part, we'll look at some of the arguments for and against the usage of AI in healthcare. There are four topics covered here. 'PAPA' is a term first used by Mason in their book 'Four Ethical Problems of the Information Age.[5] The usage of intelligent technologies may affect the PAPA values of accuracy, accessibility, privacy, and ownership.[6]

The lack of applications in this search either means we've overlooked many apps or there aren't many apps that we regularly use. These figures demonstrate that this objective is feasible and that intelligent systems may affect these moral dilemmas as illustrated in Table 1.[7]

Table 1. Ethical considerations related to intelligent systems in healthcare

No	Writer	Research Title	Design	Research Aims	Results
1	Askitopoulou H, Vgontzas AN (8)	The relevance of the Hippocratic Oath to the ethical and moral values of contemporary medicine. Part I: The Hippocratic Oath from antiquity to modern times.	Literature review	To examine the relevance of the Hippocratic Oath to contemporary medical ethics and moral values.	The Hippocratic Oath remains relevant to contemporary medical ethics and moral values. It emphasizes the importance of beneficence, non-maleficence, and patient autonomy.
2	Veatch RM (9)	Hippocratic, religious, and secular ethics: The points of conflict.	Theoretical analysis	To identify the points of conflict between Hippocratic, religious, and secular ethics.	Hippocratic, religious, and secular ethics often conflict in areas such as abortion, euthanasia, and end-of-life care
3	Nissenbaum H (10)	Protecting privacy in an information age: The problem of privacy in public.	Philosophical analysis	To explore the challenges of protecting privacy in the information age.	Privacy is increasingly difficult to protect in the information age, as data is collected and shared on a large scale.
4	Kaelber DC, Jha AK, Johnston D, Middleton B, Bates DW (11)	A research agenda for personal health records (PHRs).	Literature review	To identify the research needed to develop and implement effective personal health records (PHRs).	PHRs have the potential to improve patient care, but more research is needed to develop and implement them effectively.
5	Ventola CL (12)	Social media and health care professionals: benefits, risks, and best practices.	Literature review	To examine the benefits, risks, and best practices of social media use by healthcare professionals.	Social media can be used by healthcare professionals to connect with patients, share information, and build relationships. However, it is important to be aware of the risks, such as privacy concerns and unprofessional behavior.
6	Ekblaw A, Azaria A, Halamka JD, Lippman A (13)	A Case Study for Blockchain in Healthcare: "MedRec" prototype for electronic health records and medical research data.	Case study	To develop a blockchain-based prototype for electronic health records and medical research data.	The "MedRec" prototype shows that blockchain has the potential to improve the security and privacy of electronic health records and medical research data.
7	Glasgow RE, Vinson C, Chambers D, Khoury MJ, Kaplan RM, Hunter C (14)	National Institutes of Health approaches to dissemination and implementation of science: current	Literature review	To describe the approaches used by the National Institutes of Health (NIH) to disseminate and	The NIH uses a variety of approaches to disseminate and implement scientific findings, including research grants,

No	Writer	Research Title	Design	Research Aims	Results
		and future directions.		implement scientific findings.	training programs, and technical assistance.
	Yaacoub JP, Noura M, Noura HN, Salman O, Yaacoub E, Couturier R, Chehab A (15)	Securing internet of medical things systems: Limitations, issues and recommendations.	Literature review	To identify the limitations, issues, and recommendations for securing Internet of Medical Things (IoMT) systems.	IoMT systems are vulnerable to a variety of security threats, including cyberattacks, data breaches, and device malfunctions. Recommendations for securing IoMT systems include implementing strong security controls, educating users about security risks, and conducting regular security audits.
8	Morley J, Floridi L, Kinsey L, Elhalal A (16)	From what to how: an initial review of publicly available AI ethics tools, methods and research to translate principles into practices.	Literature review	To identify AI ethics tools, methods, and research that can be used to translate AI ethics principles into practices.	A variety of AI ethics tools, methods, and research are available to help organizations translate AI ethics principles into practices. However, more research is needed to develop and evaluate these tools, methods, and research.
9	Krittanawong C, Johnson KW, Choi E, Kaplin S, Venner E, Murugan M, Wang Z, Glicksberg BS, Amos CI, Schatz MC, Tang WW (17)	Artificial Intelligence and Cardiovascular Genetics.	Literature review	To review the current applications of artificial intelligence (AI) in cardiovascular genetics.	AI is being used to develop new diagnostic tools, identify genetic risks for cardiovascular disease, and personalize treatment plans.
10	Toreini E, Aitken M, Coopamootoo K, Elliott K, Zelaya CG, Van Moorsel A (18)	The relationship between trust in AI and trustworthy machine learning technologies.	Theoretical analysis	To explore the relationship between trust in AI and trustworthy machine learning technologies.	Trust in AI is essential for the adoption of trustworthy machine learning technologies. However, building trust in AI can be challenging, as AI systems can be opaque and difficult to understand.

Table 1 Illustrates a valuable insights into ethical considerations related to intelligent systems in healthcare, emphasizing the importance of core values.

Privacy

Doctors have prioritized privacy for a very long time.[8] Since the fourth century BC, doctors have been bound by the Hippocratic Oath, which includes a requirement that they keep patient information private.[9] The fundamental right to privacy can be threatened by the electronic recording of patient data.[10] Personal information that individuals may not want made

public may be contained in medical records. 11. If this information is made public, it may have an impact on a patient's ability to find or retain a job or acquire health insurance.[12]

Without the patient's knowledge or agreement, we may draw links between those statistics and other data if we combine patient information with other data in a large database.[13] The growth of computer networks, such as the Internet, has made it possible and encouraged the broadcast of personal health information.[14] The necessity to uphold the patient's right to privacy grows as a result of socializing.[15] Prior research has emphasized the potential difficulties people may encounter when attempting to preserve their private life and human dignity without impeding on innovation [in computers] and the expansion of knowledge technology.[16]

Studies have pointed to possible issues with recent technical developments, such genetics[17]. Today, hereditary diseases and characteristics may be identified. The knowledge that one may be more likely to exhibit certain traits will have an impact on how that person perceives themselves and their self-worth. According to Krittanawong et al., a person should also have the option of remaining ignorant in certain circumstances.

We keep medical information private for many reasons than only the individual's benefit [18]. Subject to extraordinary circumstances in which public health is at risk[19], this anonymity is essential for the public to have faith in the healthcare system. According to the author, this is a fundamental ethical precept.

Accuracy

When there is a chance that information saved electronically could be inaccurate [20], accuracy is a problem. Data may be swiftly distributed over several networks and machines[21]. It can be challenging or impossible to fix each database that has inaccurate information if we identify mistakes in one database.

According to one study, there is a higher chance of abuse or mistake[22] when networked and automated logging are combined. The chance of inaccurate data being input and subsequently inappropriately propagating to other systems grows as a result of the volume of data being stored and transported, which is the cause of this connection. This can make it harder to find and resolve faults.

Intelligent technology can help us make potentially fatal judgments about medical care. These selections must be based on correct facts. Medical judgments cannot be reduced to inferences based on facts, as demonstrated by earlier investigations.[23] Ethics have a role in some medical choices, such as whether to withhold care from a newborn with a serious birth defect. They concluded that it would be challenging for medical expert systems to take these ethical issues into account.

Regarding the data they can utilize, intelligent systems might be viewed as being less adaptive than people.[24] According to a different research, a doctor would not intentionally collect information from a patient but rather idiosyncratically. This quality is shared by professionals with a range of information, training, competence, and habits. With systems that need a certain amount of stability to function effectively, this oddity doesn't operate well.

According to earlier research, people frequently think that digital notes are flawless.[25] Users may get complacent while working with data as a result of its infallibility, which may result in poor conclusions. In contrast to these results, a prior study shown that nurses[26] used a smart HELP system. They discovered that mapping out treatment plans and specifics on a computer terminal at the patient's bedside increased the accuracy of the collected data. This method exists so that nurses may input data right away, before they have a chance to forget the specifics. The authors discovered that nurses used their time more effectively while using bedside computers. According to earlier research, employing computer systems may improve decision-making, assist medical professionals in managing the growing complexity of their jobs, and boost productivity and consistency in the workplace.[27]

Property

Property, especially those intellectual property rights, is Mason's third problem. It is required to gather knowledge from industry experts and input it into a computer program in order to develop an intelligent system. They can then sell this software on the open market as a commodity, but they are not required to pay knowledge contributors for their contributions[28]. Doctors can help engineers create intelligent systems by using this commodity, but they will not be fully compensated for their intellectual knowledge. Protection of property rights fosters innovation and creativity, leading to the development of new goods and procedures.[29]

In a previous paper, the authors discussed the natural rights defenses for and against software ownership, addressing further property-related concerns. According to the fight against the right to "own," software licensing may go against the "mental stage notion."[30] We are not capable of sequential

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mental operations like addition and subtraction. Although computers can complete these tasks considerably more quickly than any human, a computer program essentially only performs this. Because of this skill, a human can perform every task that a computer program can (albeit at a much slower pace). The claim is made that having computer programs can limit one's ability to think freely. Someone can stop others from performing the identical mental maneuver in their thoughts if they have a computer program. The validity of this claim in the debate over whether software may be owned has since been refuted. This argument against the application of artificial intelligence in medicine can be expanded, though. It might be claimed that medical professionals have the right to the intellectual independence required to treat their patients. It will restrict their freedom of thought and behavior if we make these physicians employ artificial intelligence to treat these patients.

Access

The last problem Mason mentions is access. The comparison between "information rich" and "information poor" raises certain issues. The most wealthy companies may access smart systems, which are mostly used by people from higher socioeconomic groups. The quality of health treatments offered to the wealthy and the poor may differ as a result of this utilization. Additionally, "information literacy" has been cited in earlier research as a crucial qualification for system users[31]. The author makes the case that the government must offer initiatives to promote awareness and education. All residents will have the chance, capacity, and willingness to access technological resources thanks to this initiative. According to the report, developing nations are information-poor and in need of a knowledge-based system (KBS) to enhance the delivery of health services.

They contend that KBS can be more effective than it already is, deliver and maintain services of higher quality than those currently offered, aid in education, provide expertise in situations in which it is impossible to do so, and help medical professionals diagnose equipment problems and make any necessary repairs to the equipment. Any of these issues may arise in underdeveloped nations, hence KBS may primarily be used there.

Aside from the four Mason outlined, another ethical concern affected by computers is autonomy. The independence a person has at work might be impacted by computer use. to determine a medical diagnosis systems.[32] The world's top doctors can be used to compile medical information for an expert system.

We will greatly enhance the doctor's ability to make decisions if this approach is used by "ordinary" doctors. However, doing so will mean lessening their autonomy. According to Floridi, if such a system acquires enough confidence, we will view it as the gold standard.

Research teams that have successfully developed and routinely employ intelligent systems can be found by looking for success markers. There are other success indicators than this routine. The creation of standards by which IS may be rated as successful or unsuccessful is the focus of the whole published study topic known as Information Systems (IS) Success. It might be difficult to decide which of these factors is most crucial, though.

DeLone and McLean examined 180 studies that demonstrated effective weather systems and discovered that they employed over 100 distinct variables[33]. Success may be gauged by writers. Six elements were incorporated into the model by these authors: system quality, information quality, IT use, user happiness, individual impact, and organizational effects[34]. Only five factors—system quality, perceived usefulness, user satisfaction, and utilization of information systems—were used by the authors to predict success.

These models are effective for measuring IS success, according to previous studies, which found that. According to their findings, both models may be used to analyze rich data to determine whether or not an IS is a success. At this stage of the study, when it was necessary to select two case studies for in-depth analysis, data on elements like system quality and perceived usefulness were not consistently available for all systems developed by the 58 research groups that had responded to inquiries about their designs. Which research team used a methodology similar to the one above to develop the most "successful" system cannot be determined solely based on the data now available. This calls for the employment of more precise case study selection criteria.

It is easy to determine how many systems each research group has developed and regularly utilized based on the data at hand. The selected variable for both information systems is the use of IS. They must be incorporated into the social structure and business process of their host organization, regardless of where they came from. This incorporation shows that these authors likewise valued it highly. There is an inferred association between the other three Seddon variables in addition to the direct relationship between the often used system and the Seddon model's "IS

usage" component. A system should have a pretty high degree of user satisfaction if it is utilized often. Here, system quality and data quality are linked. If IS is deployed, the resulting repercussions for individuals and organizations would worsen.[35] This anticipation was validated as a byproduct of the study: the system that was thoroughly examined complied with these standards.

Furthermore, there will be a concentration of data in one place if a group regularly uses many platforms. The system will be developed, tested, or used by more individuals. A group may have faced several obstacles in the past that they had to successfully conquer in order to get to where they are now in order to produce different concepts. The amount of data that may be gathered to answer research questions will expand thanks to both the variable http://wok.mimas.ac.uk and the ISI Citation database. So that the most data could be gathered in the time we had, we chose a group that utilizes the system as frequently as possible every day. In light of the anticipated future developments in artificial intelligence systems and their potential application in healthcare, it is imperative to address the ethical considerations associated with these intelligent systems. The study's insightful exploration of the moral implications highlights the need for a comprehensive approach to ensure that these technologies are deployed responsibly and ethically. To that end, the following recommendations are put forth to guide the integration of intelligent systems into medical practices while upholding core values: As intelligent systems become integral to medical decision-making processes, utmost importance should be given to their accuracy and reliability. Developers and stakeholders must work collaboratively to ensure that the algorithms and data inputs are thoroughly tested, validated, and continuously monitored to minimize errors and discrepancies in diagnoses, treatment recommendations, and patient care plans. The integration of intelligent systems in healthcare should aim to enhance accessibility and promote equity in healthcare services. It is crucial to ensure that these technologies are not only accessible to well-resourced institutions but also to underserved communities. Developers should be mindful of potential biases in data and algorithms that could perpetuate healthcare disparities and work towards developing solutions that bridge these gaps. Privacy concerns must be at the forefront of any intelligent healthcare system implementation. Patient data security and confidentiality should be rigorously maintained through robust encryption, secure data storage, and strict access controls. Transparent communication with patients about how their data is used and shared is essential in building and maintaining trust in these systems. The ownership and accountability for decisions made by intelligent systems should be clearly defined. Healthcare providers, developers, and regulatory bodies should collaborate to establish guidelines for attributing responsibility in case of system errors or malfunctions. This clarity is essential to ensure that patient well-being remains paramount and to mitigate potential legal and ethical complications. The forthcoming advancements in artificial intelligence within healthcare present unprecedented opportunities to transform the industry. However, these advancements must be approached with careful consideration of the ethical dimensions associated with their implementation. By upholding core values such as accuracy, accessibility, privacy, and ownership, we can ensure that intelligent systems in medicine are harnessed responsibly and ethically, resulting in improved patient outcomes, equitable healthcare services, and enhanced overall well-being. It is recommended that stakeholders across the medical, technological, and regulatory domains collaborate to establish comprehensive frameworks that guide the development, deployment, and ongoing management of intelligent healthcare systems.

While the study provides valuable insights into the moral implications of utilizing intelligent systems in medicine and emphasizes the importance of upholding core values such as accuracy, accessibility, privacy, and ownership, there are certain limitations that should be acknowledged. These limitations may impact the comprehensive understanding and implementation of intelligent systems within the healthcare landscape: The study focuses on four key ethical factors—accuracy, accessibility, privacy, and ownership—when considering the integration of intelligent systems in healthcare. However, the ethical landscape surrounding AI in medicine is multifaceted and could involve additional dimensions such as transparency, accountability, informed consent, and potential unintended consequences. Ignoring these aspects could result in incomplete ethical considerations and potential challenges during implementation. The ethical considerations discussed in the study are based on the prevailing values and standards at the time of its publication. However, ethical norms and societal expectations can evolve over time. As AI technology advances and becomes more integrated into healthcare practices, new ethical

challenges may emerge, requiring continuous reevaluation and adaptation of ethical frameworks to address emerging concerns. The study emphasizes the importance of respecting core values in AI applications, but the implementation of these values can sometimes create ethical tensions. For instance, while ensuring patient privacy is crucial, it may conflict with the need for data sharing to train and improve AI models. Achieving a balance between these principles can be complex and requires careful deliberation. Varied cultures and communities place varied emphasis on distinct ethical concerns. The standards of ethics that apply in one situation may not be applicable in another. The study does not deeply delve into the nuances of cultural differences, which could impact the successful implementation of intelligent healthcare systems on a global scale. The study primarily addresses ethical considerations but may not extensively cover the regulatory and legal challenges associated with AI in healthcare. Navigating complex regulatory landscapes and ensuring compliance with evolving laws related to data privacy, medical device regulations, and liability can pose significant. While the study's focus on the moral implications of AI in healthcare and its emphasis on core values is commendable, it's important to recognize the limitations inherent in any study.

CONCLUSION

In conclusion, a more comprehensive understanding of the ethical dimensions of intelligent healthcare systems requires an ongoing exploration of various factors, an acknowledgment of changing ethical norms, and a willingness to adapt ethical frameworks to new challenges as they arise. Future developments in artificial intelligence systems, a method of artificially active healthcare, are anticipated. The ethical considerations of using AI to healthcare are explored in this article. This section lists four moral considerations. Any use of intelligent systems in medicine must adhere to fundamental principles such as accuracy, accessibility, privacy, and ownership.

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REFERENCES

1. Khan I, Dewangan B, Meena A, Birthare M. Study of Various Cloud Service Providers: A Comparative Analysis. In5th International Conference on Next Generation Computing Technologies (NGCT-2019); 2020 Mar 1.
2. Maedche A, Legner C, Benlian A, Berger B, Gimpel H, Hess T, Hinz O, Morana S, Söllner M. AI-based digital assistants. Business & Information Systems Engineering. 2019 Aug;61(4):535-44.
3. Kaur PD, Chana I. Cloud based intelligent system for delivering health care as a service. Computer methods and programs in biomedicine. 2014;1:113(1):346-59.
4. Sparrow R Killer robots. Journal of applied philosophy. 2007;24(1):62-77.
5. Brown KC. A Consideration of Mason's Ethical Framework: The Importance of PAPA Factors in the 21st Century: A Seven-Year Study.
6. Young JA, Smith TJ, Zheng SH. Call me BIG PAPA: An extension of Mason's information ethics framework to big data. Journal of the Midwest Association for Information Systems. 2020; 2:17-41.
7. Keshta I, Odeh A. Security and privacy of electronic health records: Concerns and challenges. Egyptian Informatics Journal. 2021;1:22(2):177-83.
8. Askitopoulou H, Vgontzas AN. The relevance of the Hippocratic Oath to the ethical and moral values of contemporary medicine. Part I: The Hippocratic Oath from antiquity to modern times. European spine journal. 2018;27(7):1481-90.
9. Veatch RM. Hippocratic, religious, and secular ethics: The points of conflict. Theoretical medicine and bioethics. 2012; 33(1):33-43.
10. Nissenbaum H. Protecting privacy in an information age: The problem of privacy in public. InThe Ethics of Information Technologies. 2020(13): 141-178..
11. Kaelber DC, Jha AK, Johnston D, Middleton B, Bates DW. A research agenda for personal health records (PHRs). Journal of the American Medical Informatics Association. 2008;15(6):729-36.
12. Ventola CL. Social media and health care professionals: benefits, risks, and best practices. Pharmacy and therapeutics. 2014;39(7):491.
13. Ekblaw A, Azaria A, Halamka JD, Lippman A. A Case Study for Blockchain in Healthcare: MedRec prototype for electronic health records and medical research data. InProceedings of IEEE open & big data conference. 2016;13:13.
14. Glasgow RE, Vinson C, Chambers D, Khoury MJ, Kaplan RM, Hunter C. National

Institutes of Health approaches to dissemination and implementation of science: current and future directions. American Journal of Public Health. 2012;102(7):1274-81.
15. Yaacoub JP, Noura M, Noura HN, Salman O, Yaacoub E, Couturier R, Chehab A. Securing internet of medical things systems: Limitations, issues and recommendations. Future Generation Computer Systems. 2020;105:581-606.
16. Morley J, Floridi L, Kinsey L, Elhalal A. From what to how: an initial review of publicly available AI ethics tools, methods and research to translate principles into practices. Science and engineering ethics. 2020;26(4):2141-68.
17. Krittanawong C, Johnson KW, Choi E, Kaplin S, Venner E, Murugan M, Wang Z, Glicksberg BS, Amos CI, Schatz MC, Tang WW. Artificial Intelligence and Cardiovascular Genetics. Life. 2022;12(2):279.
18. Toreini E, Aitken M, Coopamootoo K, Elliott K, Zelaya CG, Van Moorsel A. The relationship between trust in AI and trustworthy machine learning technologies. InProceedings of the 2020 conference on fairness, accountability, and transparency 2020:272-283.
19. Mason RO. Four ethical issues of the information age. InComputer ethics. Routledge: 2017:pp. 41-8.
20. Dilsizian SE, Siegel EL. Artificial intelligence in medicine and cardiac imaging: harnessing big data and advanced computing to provide personalized medical diagnosis and treatment. Current cardiology reports. 2014;16(1):1-8.
21. Coventry L, Branley D. Cybersecurity in healthcare: A narrative review of trends, threats and ways forward. Maturity. 2018; 113:48-52.
22. Coventry L, Branley D. Cybersecurity in healthcare: A narrative review of trends, threats and ways forward. Maturity. 2018;113:48-52.
23. Longoni C, Bonezzi A, Morewedge CK. Resistance to medical artificial intelligence. Journal of Consumer Research. 2019;46(4):629-50.
24. Osoba OA, Welser IV W. An intelligence in our image: The risks of bias and errors in artificial intelligence. Rand Corporation; 2017.
25. Alazzam MB, Tayyib N, Alshawwa SZ, Ahmed M. Nursing care systematization with case-based reasoning and artificial intelligence. Journal of Healthcare Engineering. 2022.
26. Cai CJ, Winter S, Steiner D, Wilcox L, Terry M. Hello AI: uncovering the onboarding needs of medical practitioners for human-AI collaborative decision-making. Proceedings of the ACM on Human-computer Interaction. 2019.3(CSCW):1-24.
27. Musen MA, Middleton B, Greenes RA. Clinical decision-support systems. InBiomedical informatics. Springer, Cham: 2021:795-840.
28. Cockburn IM, Henderson R, Stern S. The impact of artificial intelligence on innovation: An exploratory analysis. InThe economics of artificial intelligence: An agenda 2018 Jan 10. University of Chicago Press.115-146
29. Luengo-Oroz M, Hoffmann PK, Bullock J, Kirkpatrick R, Luccioni A, Rubel S, Wachholz C, Chakchouk M, Biggs P, Nguyen T, Purnat T. Artificial intelligence cooperation to support the global response to COVID-19. Nature Machine Intelligence. 2020;2(6):295-7.
30. Brewer E, Demmer M, Du B, Ho M, Kam M, Nedevschi S, Pal J, Patra R, Surana S, Fall K. The case for technology in developing regions. Computers. 2005;38(6):25-38.
31. Floridi L. Information ethics. The Cambridge handbook of information and computer ethics. 2010:77-99.
32. Gorla N, Somers TM, Wong B. Organizational impact of system quality, information quality, and service quality. The Journal of Strategic Information Systems. 2010;19(3):207-28.
33. Wu JH, Wang YM. Measuring KMS success: A respecification of the DeLone and McLean's model. Information & management. 2006;43(6):728-39.
34. Shim M, Jo HS. What quality factors matter in enhancing the perceived benefits of online health information sites? Application of the updated DeLone and McLean Information Systems Success Model. International Journal of Medical Informatics. 2020; 137:104093.
35. Jeyaraj A. DeLone & McLean models of information system success: Critical meta-review and research directions. International Journal of Information Management. 2020; 54:102139.