Perception of Mistrust Towards Artificial Intelligence Applications in the Health Sector: Causes, Effects and Solutions

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ABSTRACT

The extensive use of efficient technologies in fields like science, health, economy, and media has raised concerns about data transparency, reliability, confidentiality, and bias. These issues create social anxiety and affect the perception of security. This study aims to identify why AI-based medical diagnostic systems are mistrusted, explore how this impacts clinical outcomes, and suggest improvements to enhance system reliability and user understanding. The research involved reviewing open access studies from Google Scholar, IEEE Xplore, and Web of Science, focusing on AI-based medical diagnosis reliability issues. A total of 24 sources from both international and local academic journals were analyzed. Distrust in AI-based medical diagnostics stems from technology complexity, algorithm opacity, and data security concerns. These factors decrease patient adherence to treatment and hinder healthcare professionals' adaptation to new technologies. Proposed solutions include training for healthcare professionals and patients, improved user interfaces, and greater algorithm transparency. Ethically developed AI systems, prioritizing user needs, can enhance trust in the healthcare sector. To combat mistrust, the study suggests increasing AI literature through training programs, making algorithm decision-making transparent, developing user-friendly interfaces, strengthening data security, and updating legal regulations. Implementing these recommendations should make AI more comprehensible and acceptable, enhancing patient satisfaction and service quality.

1. INTRODUCTION

Artificial intelligence (AI), in addition to the efficiency that emerging technologies provide by surpassing human capacity, also raises issues related to transparency, reliability, confidentiality and bias, which creates concerns at the societal level [1]. This technological progress plays a especially crucial function in the healthcare sector, leading to revolutionary changes in medical diagnosis and treatment processes [2]. However, these innovations also bring with them various challenges and ethical issues, creating mistrust between health professionals and patients [3].

In the healthcare sector, AI-based systems are being applied in various fields ranging from medical data analysis to patient management, from improving diagnosis to personalized treatment approaches. However, factors such as the complexity of these systems, absence of clarity in the processes of decision-making, and sometimes insufficient model accuracy cause concern and mistrust [4]. Moreover the ethical and privacy issues raised by AI applications affect the trust of patients and healthcare providers in these technologies [5].

This study examines the main reasons for the lack of trust in AI-based medical diagnosis systems in the healthcare sector, the effects of this mistrust on clinical outcomes and possible solutions. By addressing the benefits and challenges of AI's applications in healthcare, This study primarily aims to explore the ways in which this technology may be integrated more effectively and safely [6].

2. MATERIALS AND METHODS

In this research, a review of the literature was performed, centering on the factors contributing to issues in the dependability of AI-based medical diagnostic systems. Articles from open access sources in Google Scholar, IEEE Xplore, and Web of Science databases were examined. A total of 24 sources were used, 15 of which were selected from international English-language journals with a high impact factor, and 9 of which were selected from local Turkish-language journals that are recognised as authorities on health technologies. These sources serve the purpose of ensuring compatibility with the scope and depth of the subject and maximising the objectivity of the research.

2.1. Usage Areas of Artificial Intelligence in Health Sector

Medical diagnostics, imaging, patient management and monitoring, personalised treatment, robotic surgery, drug discovery and development, disease spread modelling, virtual health assistants, patient risk assessment, The primary domains in which artificial intelligence holds transformative potential for the healthcare sector are in optimizing electronic health records and enhancing clinical decision support systems [7].

Medical Diagnostics

Artificial intelligence provides critical support in diagnosing diseases such as cancer by learning from large data sets. Systems such as IBM Watson Health improve diagnostic processes by analysing complex data and contribute to faster, more accurate results [8].

Imaging and Radiology

Companies such as GE Healthcare and Siemens Healthineers are making MRI and CT scans faster and more accurate using AI-supported software, and the use of artificial intelligence in mammography devices is improving breast cancer detection [9].

Patient Management and Follow-up

Systems such as Cerner Health Intent and Epic Systems monitor a patient's health status to provide information about risks and improve patient data management using artificial intelligence in electronic health records [10].

Personalised Treatment

Systems like IBM Watson Oncology and Tempus leverage genomic and clinical information to develop more individualized treatment strategies, offering customized therapy suggestions in the realm of oncology [11].

Robotic Surgery

Robots enhanced with AI technology, like those from Intuitive Surgical's Da Vinci series, empower surgeons to conduct operations with greater precision and enhance procedural efficiency [12].

Drug Discovery and Development

Platforms such as Atomwise and Benevolent AI identify new drug candidates by screening molecular structure and discover potential drug targets by analysing biological databases [13].

Disease Propagation Modelling

Systems like BlueDot predict global disease outbreaks using artificial intelligence and provide early warnings [14].

Virtual Health Assistants

Applications such as Ada Health App and Babylon Health analyse patients' symptoms, provide information about possible conditions and offer virtual consultations [15].

Patient Risk Assessment

Systems like Jvion utilize big data analytics to ascertain health risks in patients and suggest preventive actions [16].

Healthcare Decision Assistance Systems

Platforms like Epic Systems and Cerner aid in the decision-making of physicians by processing and interpreting clinical data [17].

Electronic Health Records (EHR) Optimisation

Software like Allscripts uses artificial intelligence to more effectively manage patients' electronic health records [18].

2.1. Causes of Mistrust

Technical Reasons

Lack of Understanding of Complex Algorithms: The complexity of algorithms in artificial intelligence systems and the lack of a clear understanding of these processes lead to mistrust [19] his makes it difficult, particularly for those without a technical background, to comprehend the workings of the system and the basis of its decision-making. Model Accuracy and Reliability: Accuracy and reliability of AI models are of paramount importance, especially when making critical decisions such as health diagnoses [20].

Modelling errors or inaccuracies may lead to incorrect diagnosis or treatment recommendations.

Algorithmic Bias and Data Quality: Algorithms depend on the quality and variety of the data sets they are trained on [21]. Inaccurate or incomplete data can lead to algorithmic biases and unfair results.

Legal and Ethical Reasons

Accountability and Responsibility: Accountability and responsibility issues behind AI decisions create ambiguity in the legal framework [22]. There are uncertainties about the impact of automated decision-making systems on human rights and the correction of wrong decisions.

Privacy and Data Security: Privacy and security of patients' personal data is a major concern in AI applications [23]. Data leaks and misuse risks can increase mistrust among patients and healthcare professionals.

Social and Cultural Reasons

General Distrust and Resistance to Technological Determinism: There is a general mistrust of artificial intelligence systems and concerns about their impact on humanity [15]. Opposition to the possible control of technology over humanity triggers social and cultural resistance.

Valuing the Human Aspect in Healthcare: While technology's role in healthcare continues to grow, the significance of preserving and highlighting the human touch remains appreciated by both patients and healthcare practitioners [17]. This can lead to a cautious approach to technology

Educational and Communication Challenges

Awareness and Education Efforts: The complexity of AI systems' algorithms and technical terminology can be challenging for healthcare professionals and patients to understand. This difficulty in understanding leads to questioning the logic and reliability of AI decisions. The absence of adequate education and awareness programs creates uncertainty about the operation and decision-making processes of these systems, potentially increasing mistrust.

Communication Barriers: Communication barriers arising from technical jargon and the intricacies of algorithms can lead to a lack of understanding and subsequent mistrust between healthcare workers and patients. This gap can reduce confidence in the decision-making processes and outcomes of AI systems, further exacerbating mistrust issues.

Technological Advancements and Limitations

Continuous Improvement in AI Technologies: While advancements in AI technologies offer significant potential in healthcare services, their constant state of evolution and development can create uncertainty and mistrust. Even though technological innovations may enhance model accuracy and reliability, the ever-changing nature of these AI systems, especially in critical health decision-making, can lead to trust issues.

Limitations of Current AI Models: The limitations of current AI models, particularly in medical decision-making processes, can lead to mistrust. The accuracy and reliability of these models are crucial, as errors or inaccuracies could result in incorrect diagnoses or treatment recommendations. Furthermore, the need for continuous updates and improvements in these models can amplify uncertainty and lack of trust.

Impact of AI on Healthcare Dynamics

Changing Roles in Healthcare: AI is transforming roles and operations in the healthcare sector, particularly in clinical decision support processes. This transformation alters traditional roles and relationships between healthcare professionals and patients, which in some cases, can create mistrust and resistance.

Patient-Physician Relationship Dynamics: The impact of AI on the patient-physician relationship can influence the trust of both patients and healthcare professionals in AI systems. The increase in technological interventions might, in some cases, diminish the importance of human touch, leading to mistrust between patients and healthcare providers.

2.1.1. Solution Pathways

Technical Solutions

Increasing Transparency and Explainability of Artificial Intelligence Systems: Making the decision-making processes of systems more understandable can increase users' trust in the technology [19].

Algorithmic Audits and Independent Evaluation Processes: Independent audits and external evaluation of algorithms will improve model accuracy and reliability [20].

Improving Data Quality and Reducing Bias: By using accurate and diverse data sets, reduce algorithmic bias and achieve fairer results [21].

Legal and Ethical Solutions

Developing Ethical Principles of Artificial Intelligence Applications: To fulfil their

responsibilities towards users by setting ethical standards and observing them at every stage of applications [22].

Strong Policies and Regulations for Privacy and Data Protection: Implementation of strict policies and strengthening of legal frameworks for the protection and security of patients' personal data [23].

Social and Cultural Solutions

Educating the Society and Health Professionals on Artificial Intelligence: Reduce misunderstandings and concerns about the technology by raising awareness about the functioning and potential of artificial intelligence [15].

Establishing Social Confidence to Enhance Recognition and Embracement of Artificial Intelligence Innovations: To increase trust in artificial intelligence technologies by organising training programmes and campaigns for different segments of society [17]. Adopting Human Centred Design Approaches: Prioritising human needs and values in technology design and applications, emphasising the positive effects of technology on humanity [18] on issues related to transparency, explainability, model accuracy, and reliability of decision-making processes of AI systems This also stresses the need for robust policies and regulations concerning ethical usage, data privacy, and security for these systems. Within this framework, it is determined that a multidisciplinary strategy is essential for the development and application of AI solutions in the healthcare industry.

Enhanced Interdisciplinary Collaboration

Collaborative Development of AI Solutions: Enhancing interdisciplinary collaboration in the development of AI solutions in healthcare is crucial. This collaboration should include clinical experts, data scientists, ethicists, and patient representatives. Such an approach will increase the efficacy and acceptance of AI in healthcare, while also helping to address ethical and technical challenges.

Robust Implementation Frameworks

Structured Deployment and Monitoring: The importance of structured deployment and continuous monitoring in the implementation of AI solutions in healthcare should be emphasized. This is necessary to ensure the effective functioning of AI applications in real-world conditions. Continuous monitoring and evaluation of AI in improving patient outcomes are essential.

Advocating for Patient-Centered AI Development

Patient Involvement in AI Development: Greater patient involvement in the development of AI algorithms can lead to more balanced and fair outcomes. This includes responsible data sharing, inclusive data standards, and patient-centered approaches in algorithm development. Patient participation can help make AI applications more ethical and balanced.

Regulatory Enhancement and Global Standards

Harmonizing AI Regulations Globally: Developing harmonized regulations and standards for AI applications globally can support the ethical use of these technologies and provide a global approach to data privacy and security. This will strengthen the ethical and legal framework for AI in healthcare and encourage international collaboration.

Comprehensive Data Governance

Strengthening Data Governance in Healthcare AI: Enhancing data governance in AI applications in healthcare can help address challenges related to data privacy and security. This means implementing more sophisticated methods for data anonymization and protection. Emphasizing patient agency and consent will ensure safer and more ethical AI applications.

3. DISCUSSION

Artificial intelligence (AI) holds the capacity to transform the healthcare industry, encompassing aspects from diagnosis and treatment formulation to patient care and pharmaceutical innovation. Artificial intelligence-supported image analysis enables earlier diagnosis of serious diseases, especially cancer, reducing the burden of radiologists and accelerating diagnostic processes. In addition, in personalised medicine applications, it enables the development of more effective treatment methods by analysing genetic, environmental and lifestyle data of patients.

However, despite these advances, factors such as technical difficulties, legal and ethical issues, and sociocultural resistance may prevent the full realisation of this potential. The intricacy of AI systems coupled with the opacity in their decision-making mechanisms results in trust concerns among healthcare practitioners and patients alike. Algorithmic bias and data quality increase the risks of misdiagnosis and treatment, and complicate the acceptance of AI-based healthcare services. It is imperative to establish strong policies and regulations on accountability,

ethical use and privacy of AI applications. Adherence to ethical standards is crucial in the creation and deployment of AI systems, with respect for data privacy and patients' rights being paramount. Moreover, considering social and cultural contexts, embracing human-centric methodologies in the design and implementation of AI technologies, as well as educating and informing the public, are essential. The progression of AI applications in the healthcare industry is markedly advancing due to the continuous evolution of technologies and data analysis techniques. However, for these technologies to realise their full potential, challenges and ethical concerns need to be overcom. This requires a multidisciplinary approach and requires the collaboration of experts in technology, law, ethics, and health.

4. Conclusion

Resistance to artificial intelligence (AI) technologies represents a significant obstacle in maximizing the full potential of AI within the healthcare industry. This research underscores the significance of approaches to augment the efficient utilization of AI in the healthcare industry and to optimize the application of groundbreaking technologies in this domain. The Ministry of Defence emphasizes that the development and deployment of technology with a focus on human-centric design is crucial for steadily establishing trust within the sector.

These results provide important insights that should be taken into account by all parties involved in the development and implementation of AI solutions for the healthcare sector stated that mistrust towards AI technologies is not only a technical problem but also represents a wide-ranging social and ethical issue. This study emphasises the need for progress on issues related to transparency, explainability, model accuracy, and reliability of decision-making processes of AI systemsThis also stresses the need for robust policies and regulations concerning ethical usage, data privacy, and security for these systems. Within this framework, it is determined that a multidisciplinary strategy is essential for the development and application of AI solutions in the healthcare industry.

Conflict of Interest

No conflict of interest was declared by the authors. In addition, no financial support was received.

Ethics Committee

The study protocol was approved by the Ethics Committee of Sakarya University of Applied Sciences.

Author Contributions

Study Design: CÖ, AD & MA; Data Collection: AD & MA; Statistical Analysis: CÖ&AD; Data Interpretation: AD & MA; Article Preparation: AD, Literature Review:AD. All authors have read and accepted the published version of the article.

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