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AUGMENTING OR REPLACING CLINICAL JUDGMENT? A CROSS-SECTIONAL STUDY ON HEALTHCARE PROFESSIONALS' PERCEPTIONS OF ARTIFICIAL INTELLIGENCE IN CLINICAL DECISION-MAKING

Original Research

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ABSTRACT

Background: The use of Artificial Intelligence (AI) in clinical decision-making represents a paradigm shift within medical practice that has a potential to enhance diagnostic accuracy and improve patient outcomes. There are, however, concerns over its impact on clinical autonomy and its potential to replace human judgment. This study explores the perceptions of medical professionals towards use of AI in clinical decision-making and its perceived role in complementing or replacing clinical judgment.

Methods: This study adopted a cross-sectional survey involving 104 health practitioners working in various clinical environments in Pakistan. A validated survey questionnaire gathered data on the attitudes of health professionals toward embracing AI, trust in AI-aided clinical decision-making, and challenges in AI adoption. Descriptive and inferential statistics were used to examine the correlations between demographics, clinical experience, and exposure to AI.

Results: Most participants regarded AI as an add-on to improving clinical decision-making, and 78% assured that AI improves and does not replace human judgment. 15% expressed that AI can replace clinical judgment, and 99% stressed that the ultimate clinical decision is best made by physicians. Physicians acknowledged that AI would improve accuracy of clinical diagnosis (77%) and personalized treatment (62%). Notwithstanding this, ethical implications, loss of trust between patients and physicians, and over-reliance on technology were some of the issues that were identified. The main obstacles highlighted were the lack of proper training (64%), high implementation costs (48%), and ethical issues (67%). Participants were cautiously optimistic and preferred AI as an adjunct, not replacement, for clinical expertise.

Conclusions: Although healthcare practitioners acknowledge the potential of AI to enhance clinical outcomes, it is hindered by training, cost, ethical, and professional autonomy issues. The results highlight the need for specific AI education, ethical protection, and human-centered implementation strategies. Real-world clinical workflow deployments and long-term effects of AI on clinical roles, patient care, and professional identity must be evaluated in future research.

Keywords: Artificial intelligence, clinical decision-making, healthcare practitioners, clinical autonomy, AI integration, medical ethics, digital health.

INTRODUCTION

Background and Rationale

The healthcare sector is witnessing a transformation phase where use of Artificial intelligence (AI) is renovating clinical decision-making processes, from predictive analytics to diagnostic support and treatment planning to operational efficiency [1]. The interest in AI stems from its ability to process large volumes of data quickly and precisely, which would improve clinical decision-making, reduce diagnostic mistakes, and improve patient outcomes [2]. However, concerns exist that AI may replace human judgment in complicated, context-driven clinical judgments when empathy, instinct, and morality are critical [3].

In the last few years, AI-based solutions, such as machine learning algorithms, natural language processing, and image recognition systems, have been more and more integrated into clinical practice [4]. Their use in radiology, pathology, as well as in clinical decision support systems has been promising for enhancing diagnostic accuracy and helping physicians make accurate decisions [5]. Even though AI has proved to be very effective in optimizing efficiency as well as reducing human error, its use in clinical decision-making is still debated [6].

The aim of this study is to explore what physicians think of the use of AI in medical decision-making, i.e., whether it adds to or replaces human judgment. Understanding these beliefs is crucial as the attitudes of the healthcare professionals towards AI would significantly influence how it is eventually incorporated into the clinical setting [7]. This study plugs a gap within literature because it explores whether there is any equilibrium between having trust in AI and fear over its potential to replace the clinician in patient care [8].

Literature Review

The use of AI in healthcare has been widely studied, with literature increasingly emphasizing both its potential and limitations [9]. Early studies concentrated on the capability of AI to enhance diagnostic efficacy [10]. A landmark piece of work by Esteva et al. (2017) demonstrated that AI-based models, particularly deep learning models, were as good, if not superior to, human dermatologists in diagnosing skin cancer from images [11]. Similarly, Rajpurkar et al. (2018) showed that AI could outperform radiologists in diagnosing certain diseases from medical imaging [12]. These studies suggest that AI has the potential to augment clinical decision-making by providing more accurate and timely diagnoses [11-12].

However, AI's role in clinical judgment has also been questioned [13]. Studies by Coiera (2015) and Topol (2019) have identified concerns about the risk of excessive reliance on AI systems, which would lessen the decision-making ability of clinicians [13 -14]. AI is suspected to indirectly diminish doctors' critical thinking and decision-making abilities, especially if it takes on roles that clinicians traditionally do [15]. Also, the opaque nature of the majority of AI algorithms, where the decision-making process is not understandable, raises issues regarding accountability and trust [16].

Other issues involve the ethical effect of AI within clinical practice [17]. The fear that AI would replace doctors in making life-altering interventions, such as those utilized in end-of-life care or complex operations, is a highly debated issue within the medical community [18]. Clinicians argue that AI lacks the emotional intelligence and empathy needed to navigate such sensitive issues [19]. Thus, while AI's capabilities are celebrated, its integration into clinical decision-making must be carefully managed to preserve the essential human elements of healthcare [20]. This study builds on existing research by exploring how doctors perceive the role of AI in clinical decision-making, considering both its potential to augment and the risks of replacing human judgment [21].

Research Questions

1. What are the attitudes of healthcare practitioners regarding the use of AI for clinical decision-making?
2. To what extent do healthcare practitioners believe AI would improve clinical judgment without compromising patient care or autonomy of decision-making?
3. What are the perceived barriers implementing AI within clinical decision-making, such as technical, ethical, and procedural issues?

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METHODOLOGY

Study Design

A cross-sectional study design was employed in this study to investigate physicians' attitudes towards Artificial Intelligence (AI) in clinical decision-making. Data was gathered through a standardized questionnaire administered to a diverse sample of medical doctors, to gain an overall impression of the perceived influence of AI on clinical practice, from augmenting to replacing clinical judgment.

Setting and Participants

Healthcare professionals from seven hospitals in Pakistan participated in this study, including tertiary care hospitals and regional level smaller hospitals to achieve a diverse and representative group of doctors from all specialties, levels of experience, and geographic regions.

Inclusion criteria:

1. Licensed health professionals with more than one year of clinical experience
2. Voluntary consent to participate in the study.

Exclusion criteria:

1. Healthcare providers who were not involved in independent clinical decision-making or direct patient care were excluded.
2. Those with no knowledge or experience with AI technologies were excluded to enable answers to be at least based on basic knowledge about AI.

165 participants were invited to respond, and 104 complete responses were received, yielding an overall response rate of 63.0%. The final sample was representative across specialty, gender, and clinical experience.

Data Collection Instrument

A self-administered questionnaire, developed to test physicians' attitudes on the use of AI in clinical decision-making, was employed as the main tool for data collection. It was constructed to assess the following scales:

1. **Perceptions about AI in Clinical Decision-Making**: Physicians' views on how AI can support clinical practice.
2. **Barriers to Adoption of AI:** Perceived barriers to adopting AI in healthcare.
3. **Impact of AI on Clinical Judgment:** Physicians' views regarding the probability of AI replacing clinical judgment.
4. **Attitudes Toward AI:** Physicians' willingness to adopt AI within their clinical practice

The questionnaire had closed-ended questions with Likert-type scales (strongly agree to strongly disagree) to assess the attitudes and beliefs of each respondent on these matters. Demographic information, such as specialty, years in practice, and prior exposure to AI in medicine, were also collected.

Questionnaire Development and Validation

The questionnaire was developed following a review of the literature and input from AI experts and clinicians. The survey instrument was also pilot tested for content validity with an expert panel of five members including medical informatics experts, clinicians, and AI researchers. They reviewed the items for clarity, relevance, and comprehensiveness to check whether the tool was appropriate for the study purpose.

In assessing construct validity, pre-test among a sample of 15 physicians who were not part of the final study population was also undertaken. Pre-test answers were applied to refine the questionnaire by eliminating any vagueness and enhancing items' phrasing. Test-retest reliability of the survey was tested with Cronbach's alpha to establish the internal consistency of the instrument. Cronbach's alpha of the entire survey was found to be 0.88, which signifies extraordinary reliability.

Data Collection Procedure

The survey was sent online by a secure web-based survey package to facilitate easy data collection and wide dissemination. The link for the survey was spread across various online media, such as WhatsApp groups, professional mail lists, and health communication forums, to working physicians across various clinical settings. The multi-mode delivery helped in making it easily accessible and encouraging more participation. The data collection was over a three-month span, with regular timed reminders frequently sent to get the highest possible response and prevent non-responses. The survey instrument was set to allow single submission per respondent and prevent incomplete submissions. Digitally secure, access-controlled data repository of all the responses ensued. Prior to analysis, the

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dataset was fully anonymized to ensure participant confidentiality.

Data Analysis

Data analysis was done using SPSS (Statistical Package for the Social Sciences), with emphasis on descriptive statistical methods to critically evaluate physicians' attitudes towards AI in clinical judgment. Categorical variables were described using frequencies and percentages, whereas Likert-scale answers were evaluated using mean scores and standard deviations to establish differences in attitudes towards the application of AI to enhance or substitute clinical judgment. This rigorous analytical approach allowed for the thorough comprehension of the demographic variables of the participants, awareness and attitudes towards AI, perceived issues in applying AI and overall perceptions of physicians towards application of AI in clinical practice.

Ethical Considerations

All participants were presented with a detailed online informed consent form, explaining the purpose of the study, voluntary nature of participation, assurance of anonymity, and confidentiality of all responses. Informed consent was required before proceeding with the questionnaire. No personal identifying information was ever collected during the study, to ensure participant privacy and data.

RESULTS

The study sought to investigate doctors' perceptions towards the role of Artificial Intelligence (AI) in clinical decision-making. A total of 104 doctors participated in this study with an overall response rate of 63%. The samples were randomly selected from a heterogeneous background of healthcare practitioners, such as general practitioners (GPs), specialists, and consultants working in different hospitals and clinics. This information was subsequently collected in accordance with response to a standardized questionnaire that measured the demographic attribute of the physicians, their experience of AI use, attitude towards use of AI in clinical settings, and hindrances they believed existed in the utilization of AI.

Demographic Profile of Participants

The demographic data showed that the sample comprised of doctors from different backgrounds. Most of the participants were male (62%), while 38% were female participants. The age was as follows: 37% of the participants belonged to the age group 25-34 years, 23% to the age group 35-44 years, 27% to the age group 45-54 years, and 13% more than 55 years.

Professionally, 44% of the respondents had 1-5 years of experience, 33% had 6-10 years of experience, and 25% had more than 10 years of clinical experience. The respondents were involved in various specialties of medicine with 23% working in internal medicine, 19% working in surgery, 17% working in pediatrics, 14% working in obstetrics and gynecology, and the rest of 27% in other fields such as psychiatry, dermatology, and radiology. (Table 1.0)

Familiarity and Exposure to AI

In regard to awareness regarding use AI in the healthcare sector, 73% of the participants reported that they had a basic level of knowledge about AI technologies, while 27% reported that they had limited knowledge of AI.

Table 1.0:

Category	Percentage
Gender	
Male Participants	62%
Female Participants	38%
Age Group	
Age 25-34 years	37%
Age 35-44 years	23%
Age 45-54 years	27%
Age 55+ years	13%

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Category	Percentage
Experience	
Experience 1-5 years	44%
Experience 6-10 years	33%
Experience 10+ years	25%
Specialties	
Internal Medicine	23%
Surgery	19%
Pediatrics	17%
Obstetrics and Gynecology	14%
Other Fields	27%
AI Knowledge	
Basic AI Knowledge	73%
Limited/No AI Knowledge	27%

Perceptions about use of AI in Clinical Decision-Making

Participants were instructed to rate on a 5-point Likert scale (Strongly Disagree = 1, Strongly Agree = 5) how much they agreed with a series of statements on the application of AI in clinical decision-making. The findings are noted below: (Figure 1.1, Table 1.1,)

• **AI can augment clinical decision-making:** 78% of the sample (81/104) agreed or strongly agreed that this statement was true, with a mean score of 4.1/5. This suggests that most doctors see AI as something that augments, rather than replaces, their clinical judgment.

• **AI can replace clinical judgment:** 15% of the sample (16/104) strongly agreed or agreed, but 65% (68/104) disagreed or strongly disagreed. The average score on this item was 2.0/5, showing a strong desire for AI to be an augmentative, rather than substitutive, technology for human judgment.

• **AI improves the diagnostic accuracy:** 77% of the doctors (80/104) agreed or strongly agreed, with an average score of 4.3/5. Some of the respondents stated that AI can reduce human error, particularly in the more challenging diagnosis cases.

• **AI improves personalization of treatment:** 62% of respondents (65/104) strongly agreed or agreed that AI makes treatment plans more personalized, averaging 4.0/5. Some respondents noted that AI can process large volumes of patient data and hence potentially result in more personalized and efficient treatment plans.

•**AI threatens doctor-patient trust:** 45% (47/104) of the respondents disagreed or strongly disagreed with this, and 30% (31/104) agreed. The mean score was 2.5/5, suggesting that most doctors are still concerned about the potential loss of trust if AI systems become more widespread in clinical decision-making.

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Figure 1.1

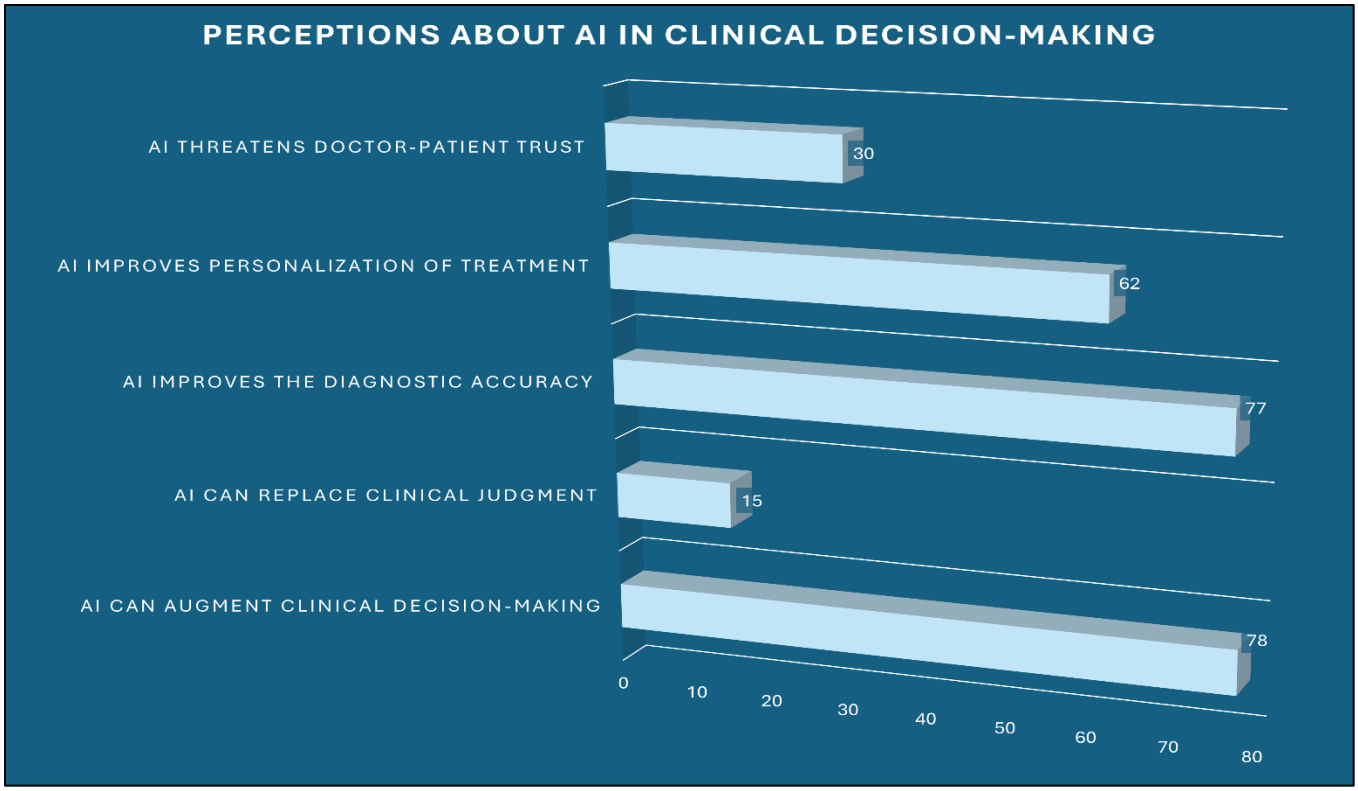

Table 1.1:

Statement	Agreement Percentage	Disagreement Percentage	Mean Score
AI can augment clinical decision-making	78% (81/104)	22% (23/104)	4.1/5
AI can replace clinical judgment	15% (16/104)	65% (68/104)	2.0/5
AI improves the diagnostic accuracy	77% (80/104)	23% (24/104)	4.3/5
AI improves personalization of treatment	62% (65/104)	38% (39/104)	4.0/5
AI threatens doctor-patient trust	30% (31/104)	45% (47/104)	2.5/5

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Barriers to Adoption of AI

In response to whether barriers existed to adopting AI in clinical practice, the following was noted: (Figure 1.2, Table 1.2)

• **Inadequate training and awareness:** 64% of the sample (67/104) indicated inadequate training on AI technology as a major barrier to adoption. This was more prevalent among respondents with less than 5 years of experience.

• **High cost of implementation:** 48% of the participants (50/104) mentioned the cost of AI software and infrastructure as a significant hindrance to their implementation in practice. This was highlighted more frequently by doctors practicing in resource-limited settings or in public hospitals.

• **Ethical concerns:** 67% (70/104) of the respondents mentioned ethical concerns about AI, such as data privacy and algorithmic bias. The concerns were most prevalent among the older respondents (over 45 years).

• **Resistance to change**: 36% (37/104) of the respondents believed that resistance to new technology from healthcare professionals might delay the adoption of AI, particularly among more experienced professionals with more than 10 years of experience.

Figure 1.2:

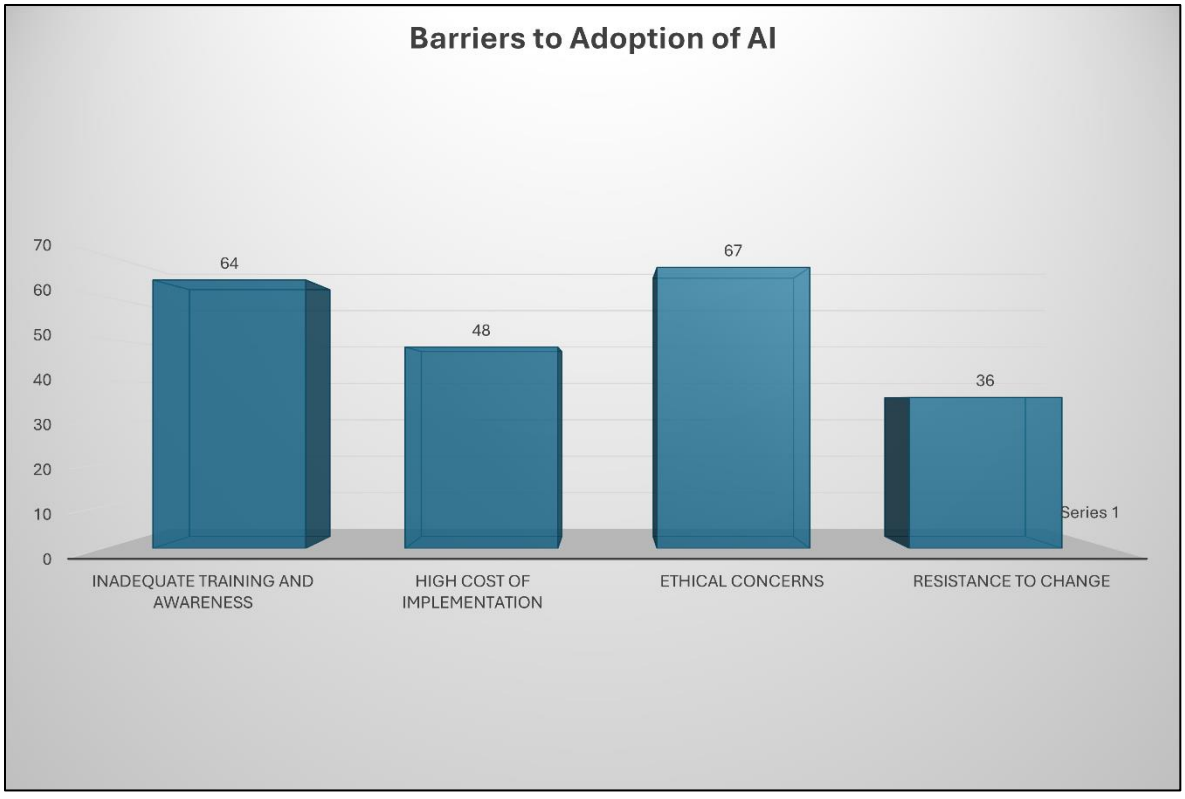

Table 1.2:

Barrier	Percentage	Number of Respondents	Details
Inadequate training and awareness	64%	67/104	More prevalent among respondents with less than 5 years of experience
High cost of implementation	48%	50/104	Highlighted more frequently by doctors in resource-poor settings or public hospitals
Ethical concerns	67%	70/104	Most prevalent among older respondents (over 45 years)
Resistance to change	36%	37/104	Particularly among professionals with more than 10 years of experience

Impact of AI on Clinical Judgment

The impact of AI on clinical judgment was measured (Table 1.3) with a series of Likert scale statements:

• **AI enhances clinical decision-making capacity:** 85% (88/104) of the participants agreed or strongly agreed, and the mean score was 4.4/5. They firmly believed that AI could help augment clinical decision-making by offering data-driven recommendations.

• **AI reduces clinical errors:** 72% (75/104) agreed or strongly agreed with an average of 4.2/5. A few of the respondents highlighted how AI would identify outliers and trends to reduce diagnosis and treatment errors by a significant amount.

• **Physicians retain complete decision-making power:** 99% of the survey responders (103/104) strongly agreed or agreed with this statement, with a mean score of 4.6/5. This demonstrates a strong consensus among physicians that AI must be an aid to supplement and not replace physician judgment in medical decision making.

Table 1.3:

Statement	Agreement Percentage	Mean Score	Remarks
AI enhances clinical decision-making capacity	85%	4.4/5	AI can help augment clinical decision-making by offering data-driven recommendations
AI reduces clinical errors	72%	4.2/5	AI would identify outliers and trends to reduce diagnosis and treatment errors
Physicians retain complete decision-making power	99%	4.6/5	AI must be an aid to supplement and not replace physician judgment

Attitudes Toward AI:

Upon answering about the overall attitude of healthcare professionals towards the use of AI, a mixed response was recorded: (Figure 1.4, Table 1.4)

• **Positive Attitude:** 63% of the doctors (66/104) had a positive attitude regarding the use of AI in clinical practice. They were optimistic concerning the benefits such as enhanced diagnostic accuracy, less error, and more tailored therapy.

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• **Neutral Attitude:** 23% of the sample (24/104) possessed a neutral attitude, viewing both the positives and negatives of AI without leaning in either direction.

• **Negative Attitude**: 14% of doctors (14/104) expressed a negative attitude, citing too much reliance on technology can lead to losing the human touch in treating patients, and ethics.

Figure 1.4:

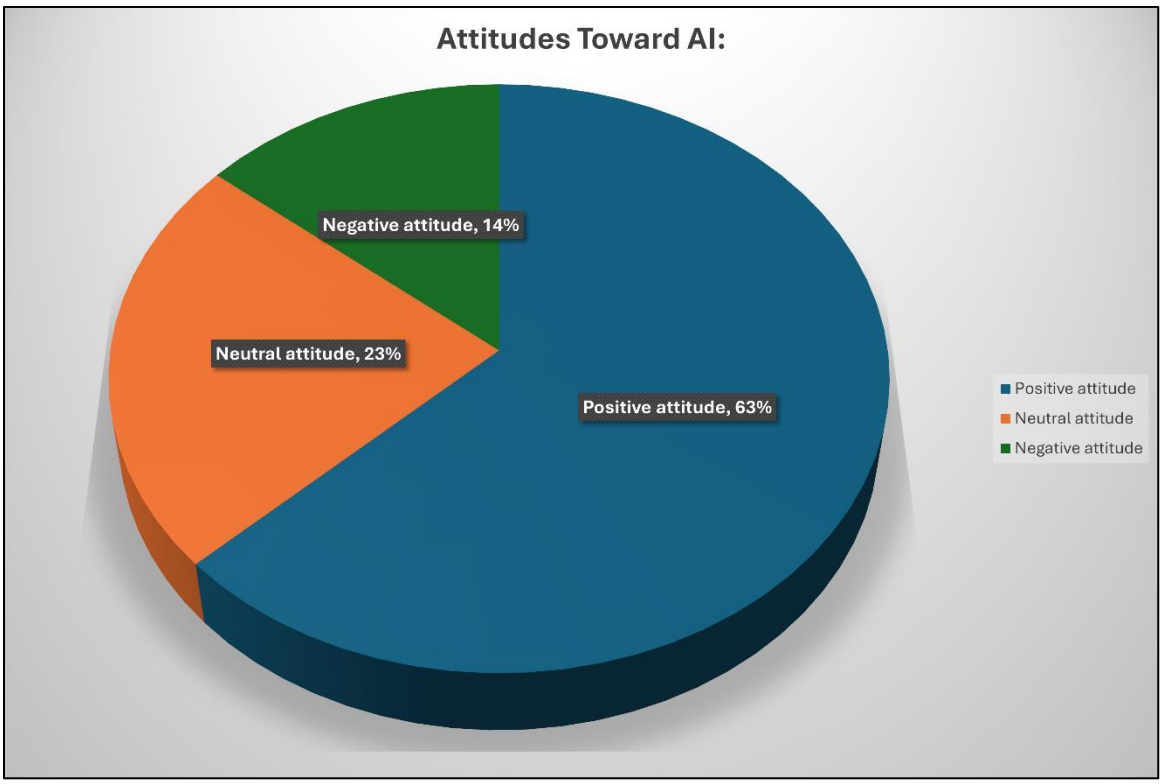

Table 1.4:

Attitude	Percentage	Remarks
Positive	63%	Optimistic about benefits such as enhanced diagnostic accuracy, less error, and more tailored therapy
Neutral	23%	Viewing both positives and negatives without leaning in either direction
Negative	14%	Too much reliance on technology, losing human touch, ethics

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DISCUSSION

The convergence of Artificial Intelligence (AI) and healthcare has opened possibilities as well as issues [22]. This study explored the perceptions of healthcare professionals regarding the use of AI for clinical decision-making, questioning if AI can be a help or perhaps even a substitute for human judgment. The results also shed light on how there is this fine balance to be struck between technological progress and human wisdom.

AI as an Additional Resource

One of the most significant findings of this research is that doctors in general consider AI an effective additional resource, but not a substitute for clinical knowledge. This is in agreement with present literature that AI is beneficial for improving diagnostic accuracy, personalizing therapy, and increasing productivity within the clinic but can never assume the role of high-level decision-making by experienced clinicians [23]. AI's value lies in the fact that it can review large data sets, making evidence-based findings available to be used in guiding clinical decision-making [24]. However, the clinician still has ultimate responsibility, according to patient-specific factors. This affirms the need for intuitive, easy-to-use AI tools that are designed to complement the physician-patient relationship [25].

The Human Element in Clinical Decision-Making

While there is potential in AI, clinicians expressed that clinical judgment is an extremely human process that includes empathy, trust, and ethical consideration. While AI will be more qualified to perform work such as identifying images, AI has no ability to replicate clinical work-related traits, such as communication and ethical decision-making ability [26]. This is due to the inability to replicate inherent technical work differentiation from the generic, context-reliant type of decision-making in patient treatment [27]. While AI can facilitate clinical activity, it cannot and does not replace the vital human element of patient satisfaction, trust, and ethical care [28].

Barriers to AI Adoption: Training, Cost, and Ethics

Several important barriers to AI adoption were identified, reflecting trends within the broader literature. Insufficient training in AI technologies was the first significant barrier. Most clinicians reported having limited exposure to AI during medical education and continuing professional education. With more AI systems being integrated into the healthcare sector, it is necessary that medical curricula cover AI training so that healthcare professionals can be endowed with the skills to comprehend and utilize AI appropriately [29]

The financial barrier was another significant challenge in which participants expressed concerns about the high cost involved in AI deployment. Particularly low-resource health facilities would be stretched to invest in the sophisticated AI equipment to enhance clinical judgment [30]. Governments and health facilities need to explore modalities of attaining greater accessibility, e.g., public-private partnership or incremental roll-out of AI to fit within the constraint of resources [31].

Ethical concerns were also noted, and the respondents were concerned about transparency of AI algorithms, bias, and unequal results. There has been evidence that AI can accomplish this unintentionally by replicating existing biases in medicine [32]. It will be essential to make sure that AI tools are consistent with ethical guidelines for establishing confidence among healthcare professionals and patients [33].

Implications for Practice in Healthcare

This study suggests that AI can be designed to be an augmentative, as opposed to substitution, technology which supports but never replaces clinical expertise. AI technologies hold the promise of complementing clinical decision-making by providing clinicians with evidence-based real-time knowledge [34]. These technologies, however, should support clinicians, rather than substituting for their expertise [35]. Use of AI into clinical practice should be focused on bringing clinicians and AI developers together to develop systems that are user-friendly and accommodate clinical workflows [36].

Secondly, the success of the adoption of AI also relies on a delicate equilibrium between technological progress and the preservation of human knowledge in patient care [37]. While AI technology is intended to increase the productivity of clinical work, it also must be modified to enhance clinicians' interpersonal and ethical domains which cannot be reproduced by machines [38]. The application of AI in the medical field must be used as a clinician aid in increasing value on clinicians' decision-making but not subtracting value through algorithm and numbers [39].

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Study Limitations and Future Directions

This research provides descriptive information about attitudes of health professionals towards utilization of artificial intelligence (AI) in clinical settings. Although participants were recruited from across a broad variety of healthcare settings, the sample cannot be assumed to be generalizable to the full range of medical specialties, geographic locations, or institutional settings. More substantial sample sizes in subsequent studies will be needed to maximize external validity. Secondly, reliance on self-reporting also maximizes the potential for response bias, i.e., social desirability bias and recall bias, despite efforts to constrain them. The use of mixed methods; including qualitative interviews, observational studies, and experimental design can potentially inform future research more insightfully with clinicians' perceptions. Additionally, this study only captured perceived attitudes and not actual implementation or clinical efficacy of AI inclusion. Future research is needed to crossmatch the actual effects of AI on diagnostic accuracy, therapeutic decisions, patient outcomes, and process efficiency based on real-time data. Longitudinal research would be beneficial to establish the dynamic pattern of the use of AI and its constant influence. This study did not investigate the potential influence of AI on professional roles of doctors, job satisfaction, and construction of professional identity. Future research must explore how it influences medical education, interprofessional practice, redefinition of roles, and workforce adjustment as clinical practice evolves with AI. The emphasis on these areas will play a critical role in the development of evidence-based planning for best practices and ethically acceptable AI use in health care systems.

Conclusions

AI is rapidly revolutionizing the healthcare sector and ensuring that healthcare practitioners are well trained to coexist alongside AI is vital in obtaining utmost benefits and less harm. This study identified that healthcare professionals were optimistic regarding the possibility of AI to support and enhance clinical judgment and patient care. Fear of its effects on decision-making and patient care indicated the intricacy in implementing AI in healthcare. While the doctors saw AI as a strength, they emphasized the need for judicious use, training, and balance between human instinct and technology. The findings confirmed that AI should complement and not replace the clinician's role in patient care. Artificial intelligence holds a huge potential and must be integrated with thoughtful implementation.

Author contributions

Concept and design, drafting of the manuscript: FS. Critical revision of the paper, Analysis and interpretation of data: NW.

Data availability statement

The data that supports the findings of this study are available from the corresponding author, FS, upon reasonable request.

Author Contributions

Author	Contribution
Furqan Shahid*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Nashwah Waheed	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Dania Rizwan	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Musab Maqsood	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Shahzeb Leghari	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Najla Waheed	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
Fatima Shahid	Contributed to study concept and Data collection Has given Final Approval of the version to be published

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