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DOCTORS' PERCEPTIONS AND EXPERIENCES OF USING ARTIFICIAL INTELLIGENCE (AI) IN MEDICAL PRACTICE IN PAKISTAN

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Abstract

Artificial intelligence (AI) is having a greater impact on clinical decision-making and workflow efficiency globally; nevertheless, Pakistan's healthcare sector has not yet fully incorporated AI. This study explores doctors' perceptions and lived experiences of using AI in clinical practice, focusing on perceived usefulness, ease of use, ethical considerations, trust, and adoption intentions. Using an interpretivist paradigm and Interpretative Phenomenological Analysis (IPA), semi-structured interviews were conducted with fifteen doctors from public and private hospitals in Islamabad and Rawalpindi. Findings indicate that doctors primarily gain AI awareness through practical, hands-on exposure rather than formal training. AI is viewed as helpful for documentation, research summarization, and organizing clinical reasoning; however, concerns about patient confidentiality, data security, algorithmic accuracy, and medico-legal responsibility restrict trust. Although AI tools were generally easy to navigate, participants stressed the need for human oversight, critical appraisal, and institutionally managed AI systems. The study extends the Technology Acceptance Model (TAM) by showing that ethical safeguards, trust, and institutional infrastructure are essential moderators of AI adoption in healthcare. AI is generally seen as a helpful healthcare tool, but significant integration demands strong governance, professional training, and safe systems.

INTRODUCTION

Artificial Intelligence (AI) is a broad term that generally denotes the capacity of computers and other programmed machines to perform tasks that typically require human intervention, analytical reasoning, and judgment. These capabilities include learning, analysing, problem solving, and making informed decisions (Russell & Norvig, 2021). AI is increasingly being used in the health sector to improve administrative coordination, treatment planning, decision support, and diagnostic accuracy. The COVID-19 pandemic further accelerated its implementation by demonstrating AI's potential in disease surveillance, rapid testing, patient triage, and real-time clinical support.

While countries like the US, China, and the UK have integrated AI into standard medical procedures, its adoption in developing nations such as Pakistan remains limited. Weak digital infrastructure, unequal access to technology, unclear regulations, and insufficient professional training are examples of constraints. The introduction of AI brings both potential and challenges for Pakistan's health sector,

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which already faces issues such as a shortage of workers, unequal service delivery, and inefficient resource allocation (Khan et al., 2024; Khalid et al., 2021).

In addition, to being technologically prepared, doctors' perceptions, interpretations, and levels of faith in these advancements are critical to the successful deployment of AI. Professional adaptability and ethical considerations are equally important.(Khan et al., 2025; Tariq et al., 2025). Worries about patient privacy, algorithmic fairness, medico-legal accountability, and system dependability influence these opinions. Additionally, doctors' trust in AI-assisted decision-making is diminished by the lack of institutional incentives and restricted access to digital technologies. Although some specialities, such as radiology, pathology, telemedicine, and infectious disease surveillance, have experimented with AI in Pakistan (Khalid et al., 2021), these efforts remain fragmented and insufficiently evaluated.

In addition to technological and ethical considerations, the successful integration of AI in healthcare depends on organizational readiness and policy support. Hospitals and clinics need structured frameworks for data management, staff training, and workflow adaptation to ensure that AI tools complement existing practices rather than disrupt them (Jiang et al., 2017; Topol, 2019). Policymakers play a crucial role in establishing clear guidelines on data privacy, algorithmic transparency, and medico-legal accountability, thereby fostering trust among both healthcare providers and patients (Khan et al., 2024). Furthermore, collaborative efforts between government bodies, academic institutions, and private technology providers are essential to promote innovation, monitor AI outcomes, and evaluate the long-term impact of AI-assisted healthcare interventions in Pakistan (Tariq et al., 2025)

Despite worldwide momentum in AI-enabled healthcare, Pakistan's scholarly involvement advanced slowly and remained primarily descriptive or quantitative. Existing surveys showed that doctors had positive attitudes towards AI and were usually aware of its possibilities. However, few studies examined how these professionals actually experienced or interpreted AI in their daily medical routines. Critical dimensions such as ethical uncertainty, trust deficits, and professional adaptations were largely unexplored through a qualitative lens. Hence, the present study addressed this gap by qualitatively examining how medical practitioners in Pakistan perceived and interpreted the usefulness and ease of use of AI technologies within clinical settings, considering how trust-related and ethical barriers shaped their behavioural intentions and readiness to adopt AI in practice. Notably, no previous qualitative study had explored doctors' lived experiences using the Technology Acceptance Model (TAM) in Pakistan.

1. Research Objective

The Primary objective of this research was to explore how doctors in Pakistan perceive the usefulness and ease of use as influencing their behavioural intention to adopt AI technologies in healthcare, considering ethical and trust-related barriers.

2. Literature Review

Artificial Intelligence (AI) has become an essential part of global healthcare, supporting clinicians in diagnosis, treatment planning, and data-driven decision-making (Russell & Norvig, 2021). Research shows that AI can improve accuracy and reduce clinical workload, although concerns about fairness, transparency, and patient safety remain (Amann et al., 2020). Countries with advanced digital systems, such as China, Japan, and South Korea, report better diagnostic support through AI tools (Cai et al., 2024), while middle-income nations like India and Malaysia continue adopting AI to address healthcare gaps (Zuhair et al., 2024; Bello et al., 2025). These global trends highlight the growing relevance of AI and the ongoing need for ethical safeguards and professional trust in clinical practice (WHO, 2021)

2.1 Global Developments in AI in Healthcare

Artificial Intelligence (AI) has profoundly influenced global healthcare by enhancing diagnostic precision, strengthening clinical decision-making, and improving hospital administration efficiency (Russell & Norvig, 2021). Its applications extend across diagnostic imaging, pharmacological research, genomics, and the management of chronic diseases. The COVID-19 pandemic further catalysed this transformation, revealing the potential of AI in infection forecasting, contact tracing, vaccine development, and rapid diagnostic support (Roppelt et al., 2024). For instance, AI systems have achieved

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diagnostic accuracies of nearly 95% in detecting COVID-19 from CT scans (Mei et al., 2020).

The global AI healthcare market is projected to exceed USD 200 billion by 2030 (European Commission, 2025), reflecting growing confidence in digital health technologies. However, international research also highlights persistent concerns around algorithmic bias, data privacy, and opacity in decision-making (Amann et al., 2020). Policymakers in regions such as the European Union and the United States have developed regulatory frameworks to ensure transparency, accountability, and ethical oversight in AI development.

2.2 AI Adoption in Asian and Middle-Income Countries

Asian countries like China, Japan, and South Korea have made remarkable strides in embedding AI into healthcare systems. Surveys expose that more than 80% of physicians in China report improved diagnostic accuracy and reduced workloads due to AI tools (Cai et al., 2024). However, concerns persist regarding data governance, informed consent, and the interpretability of algorithms.

Middle-income nations, including India, Malaysia, and Jordan, encounter structural and financial challenges similar to those in Pakistan. Deficiencies in broadband connectivity, low levels of digital literacy, and underdeveloped health information systems constrain effective adoption (Zuhair et al., 2024). Despite these limitations, AI-driven telemedicine, mobile diagnostics, and digital triage tools have demonstrated the potential to mitigate rural–urban healthcare disparities (Bello et al., 2025).

2.3 Ethical, Legal, and Trust-Related Considerations in AI Use

Ethical, legal, and trust-related considerations also influence doctors' opinions. Their readiness to adopt AI is affected by concerns about patient safety, equity, algorithmic transparency, and medicolegal accountability (Tun et al., 2025). Pakistan's National AI Policy (2025) underscores the importance of establishing a "trust framework"; however, its practical implementation depends on close collaboration among policymakers, healthcare professionals, and technology developers.

Adoption of AI is significantly influenced by trust (Amann et al., 2020; Doraiswamy et al., 2020). Doctors are generally more receptive to AI systems when they are understandable, supportive rather than replacing, and consistent with professional autonomy (WHO, 2021). Developing such trust requires thorough training, openness, strong ethical protections, and active clinical participation in system design (Hussain et al., 2024).

2.4 AI in the Pakistani Healthcare Context

In Pakistan, Umer et al. (2024) conducted a qualitative study to investigate doctors' opinions and experiences on the use of artificial intelligence (AI) in healthcare. The study found a large gap between awareness and actual adoption: although most doctors were aware of the potential advantages of AI, many were reluctant to adopt it because of concerns about patient engagement, professional identity, diagnostic accuracy, and technological reliability.The findings highlight the need for focused interventions that build confidence, address ethical and professional concerns, and improve the usability and dependability of AI in clinical settings, as awareness alone is insufficient to encourage adoption.

Technology Acceptance Model (TAM) Theory

The Technology Acceptance Model (TAM) was created in the mid-1980s by Fred Davis, who first proposed it in his doctoral thesis at the MIT Sloan School of Management in 1985 (Davis, 1985). TAM expands upon Ajzen and Fishbein's Theory of Reasoned Action, tailoring it to explain and forecast consumers' adoption of new technology. Perceived usefulness (PU), which is the degree to which a person believes a technology will improve their job performance, and perceived ease of use (PEOU), which is the degree to which a person believes using the technology requires minimal effort, are identified by the model as two important determinants of technology adoption (Davis, 1989). Particularly in areas such as healthcare, information systems, and digital breakthroughs, TAM has become one of the most significant and widely used frameworks for understanding technological adoption, and it remains reliable across diverse cultural contexts. (Chuttur, 2009; Venkatesh & Davis, 2000).

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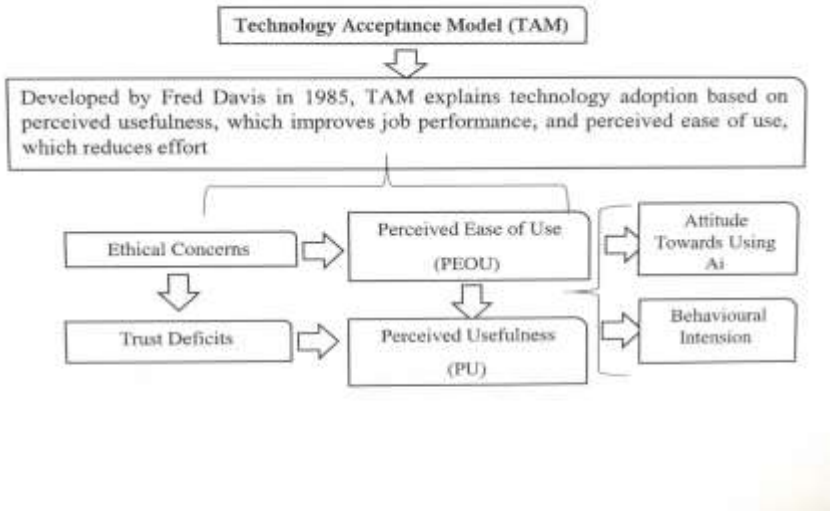
3.1 Application of Theory

In the context of Pakistan's healthcare system, the Technology Acceptance Model (TAM) offers a valuable framework for understanding and interpreting doctors' attitudes, perceptions, and behavioural intentions toward the adoption of Artificial Intelligence (AI) technologies. Doctors' perceptions of AI usefulness, such as its role in enhancing diagnostic accuracy, supporting clinical decision-making, and reducing workload, significantly shape their attitudes toward adoption. However, perceived ease of use is often limited by infrastructural constraints, low digital literacy, ethical concerns, and trust deficits. These barriers reduce doctors' motivation and behavioural intention to use AI, despite awareness and technological availability. Thus, TAM helps explain why many Pakistani doctors remain cautious or hesitant to integrate AI into routine practice. To foster greater AI adoption aligned with TAM, interventions may focus on enhancing training, improving AI system usability, strengthening ethical frameworks, and building trust; addressing both PU and PEOU dimensions as they manifest uniquely within Pakistan's medical ecosystem.

3.2 Model of Theory



This study applied the Technology Acceptance Model TAM by contextualizing it within a developing country's healthcare system and integrating ethical and trust-related dimensions into its core structure. By exploring how doctors in Pakistan interpret perceived usefulness and ease of use through the lens of professional ethics, institutional trust, and socio-cultural constraints, the research aims to offer a nuanced, context-sensitive understanding of technology adoption. This theoretical refinement contributes to expanding TAM beyond its traditional quantitative orientation, demonstrating its interpretive value in qualitative, culturally embedded analyses of medical technology acceptance.

4. Research Methodology

This section outlines the methodological framework that guided the study on doctors' perceptions and experiences with Artificial Intelligence (AI) in clinical practice. It presents the research design, philosophical stance, approach, study setting, sampling strategy, data collection procedures, data analysis techniques, measures of trustworthiness, and ethical considerations. The purpose of this methodology was to ensure transparency and alignment between the research objectives, philosophical foundations, and the qualitative design adopted.

4.1 Philosophical Worldview

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The study was grounded in an interpretivist worldview, which assumes that reality is socially constructed through human experiences and interactions (Schwandt, 2023). Interpretivism posits that individuals interpret their world within specific social and professional contexts. Within this philosophical stance, the researcher sought to understand how doctors made sense of their encounters with AI technologies, how these experiences shaped their attitudes, and how they negotiated ethical and professional boundaries. This philosophical orientation aligned with the study's qualitative design and phenomenological approach.

4.2 Research Approach

The research followed an Interpretative Phenomenological Analysis (IPA) approach, as developed by Smith, Flowers, and Larkin (2009). IPA was selected because it focuses on exploring how individuals understand and interpret their lived experiences. It draws on phenomenology to examine experience in depth, hermeneutics to interpret meaning, and idiographic to give detailed attention to each participant's narrative. Using this approach, the study sought to uncover how doctors perceived, experienced, and emotionally responded to the integration of AI technologies in their clinical work. The IPA framework also acknowledged the researcher's interpretive role in constructing meaning from participants ' accounts, consistent with the phenomenological tradition.

4.3 Research Setting

The study was conducted in selected public and private hospitals located in Islamabad and Rawalpindi, Pakistan. These hospitals offered diverse technological environments, institutional cultures, and varying degrees of exposure to AI applications. Some hospitals had already adopted AI-supported tools such as diagnostic imaging software, telemedicine platforms, and digital patient data systems. This diversity enabled the study to capture a broader, more representative understanding of how AI was experienced across different healthcare contexts.

4.4 Population and Sampling

The target population consisted of licensed medical doctors practising in Pakistan who had prior experience with or awareness of AI technologies used in healthcare. A purposive sampling strategy was employed to recruit participants who could provide rich, relevant, and meaningful insights into the phenomenon under study. Doctors were selected from specialities such as radiology, internal medicine, pathology, and surgery, where exposure to AI applications was more likely. The final sample comprised fifteen participants, and data saturation was achieved when no new themes or insights emerged from subsequent interviews. This sample size was appropriate for IPA research, which emphasizes depth and detail rather than large numbers.

4.5 Data Collection

Data were collected through semi-structured, in-depth interviews, a method well-suited to exploring personal and professional experiences in a flexible, conversational manner. The interview guide consisted of open-ended questions that encouraged participants to discuss their understanding of AI, their experiences using AI tools, their levels of trust, perceived benefits, challenges, and ethical concerns related to AI in clinical practice. Each interview lasted approximately forty-five to sixty minutes and was conducted either face-to-face or online, depending on the participant's availability and preference. All interviews were audio-recorded with informed consent, and the researcher maintained detailed field notes to capture contextual observations, nonverbal cues, and reflective insights. The semi-structured format allowed participants to elaborate freely, which enriched the depth and quality of the data collected.

4.6 Data Analysis

The data analysis followed the six-step approach outlined by Braun and Clarke (2013): (i) immersion in and familiarization with each transcript, (ii) coding of all interviews, (iii) refinement and finalization of codes, (iv) identification of emerging themes, (v) naming and defining themes and sub-themes, and (vi) extracting the meaning and essence of each identified theme and sub-theme.

4.7 Integration of Theoretical Framework and Interpretative Stance

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The Technology Acceptance Model (TAM) provided a conceptual framework for examining how perceived usefulness, perceived ease of use, trust, and ethical considerations influenced doctors' attitudes toward AI. However, TAM served primarily as a sensitizing framework rather than a deterministic model. Its constructs guided interpretation by offering conceptual anchors that helped organize and relate emerging meanings within participants' narratives. The analysis remained inductive and phenomenological, focusing on how doctors subjectively constructed and interpreted their experiences of AI in clinical contexts. The researcher did not impose pre-existing TAM categories; instead, the model's dimensions were used reflexively to interpret how participants' lived experiences affirmed, challenged, or extended theoretical assumptions. This approach preserved fidelity to the interpretivist paradigm, ensuring that theoretical guidance enhanced rather than constrained the depth and authenticity of the participants' voices.

4.8 Ethical Considerations

Ethical approval was obtained from the relevant institutional review board prior to data collection. Participants were informed about the study's objectives, the voluntary nature of participation, and their right to withdraw at any stage. Informed consent was obtained from all participants, and pseudonyms were used to protect their identities. All data were stored securely, and confidentiality was maintained throughout the research process. The information collected was used solely for academic and research purposes.

Table 1:Raw Data, Themes, and Analytical interpretations

Raw Data / Codes (Interview Excerpts)	First-Order Themes (Participant Terms)	Second-Order Themes (Researcher Interpretations)	Theme Generation (Aligned with Data Analysis)
"For me, AI became familiar during the last stages. AI could reduce the time spent on editing. My awareness of AI mainly comes from using it in ways that directly strengthen my clinical reasoning."	Learning through hands-on use; practical exposure	Awareness developed through practical engagement; Knowledge-based conceptual understanding	Understanding & Awareness of AI
"AI helps me structure reports, organize goals, and improve my workflow." "AI summarizes long research and keeps me updated." "AI organizes my notes into clear reports so I can focus on treatment."	Task simplification; information; summarization	AI increases efficiency and reduces workload; Supports evidence-based clinical decisions; Enhances productivity during high workload	Perceived Usefulness of AI
"I is incredibly simple to use.So yes, it is accessible, but it must be used with a trained and critical mind." "I personally find AI user-friendly just because it is easy does not mean everything it says should be accepted."	User-friendly interface; conversational design	Ease of use requires critical evaluation; Smooth interaction does not ensure reliability.	Codes highlighted ease of use vs. need for expert evaluation,
"Even though AI is helpful, the biggest issue for me is patient privacy. we do not know where that data is going. it puts us in a risky position regarding confidentiality."	Confidentiality concerns; accountability issues	Data privacy risks and medico-legal liability dominate	Theme from frequent mentions of ethical/data-security risks

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"Another ethical problem is that AI sometimes gives diagnoses that are too severe legally, responsibility will always fall on the doctor, ethically it still lacks accountability."			
"I trust AI only when I already have some idea of the clinical picture. A tool that changes its stance so easily cannot be trusted blindly." "AI is good for giving direction, but it is not consistent. Real trust comes only from evidence-based clinical experience, not from AI predictions."	Conditional trust; inconsistent reliability	Limited trust; AI seen as exploratory, not authoritative	Emergent theme: trust is conditional on reliability and human verification
"I definitely plan to continue using AI. AI should support the doctor, not replace the doctor. I see AI as a useful partner, not a primary decision-maker." "For AI adoption to be safe, every hospital should develop its own secure AI platform. Without institutional support, adoption will always remain limited.	AI as a support (partner); institutional safeguards necessary	Cautious adoption contingent on strong governance and infrastructure	Theme from conditional optimism and emphasis on training/regulation in data

Table 2: Socioeconomic Profile of Participants

S.no	Respondent Number	Gender	Age	Professional Eduction	Years of Employment	Job sector
1	Participant 1	Female	40	Eye Specialist	8	Private
2	Participant 2	Female	42	Eye Specialist	10	Private
3	Participant 3	Female	35	Physiotherapist	6	Government
4	Participant 4	Male	45	Physiotherapist	5	Private
5	Participant 5	Male	38	Physiotherapist	7	Private
6	Participant 6	Male	35	Orthopaedic Specialist	5	Government
7	Participant 7	Female	36	Orthopaedic Specialist	5	Private
8	Participant 8	Female	36	Dentist	4	Private
9	Participant 9	Female	31	Dentist	5	Private
10	Participant 10	Female	35	Dentist	4	Private
11	Participant 11	Male	30	Dentist	3	Government
12	Participant 12	Male	30	General Physician	4	Government
13	Participant 13	Female	32	General Physician	4	Government
14	Participant 14	Female	33	General Physician	6	Government

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15	Participant 15	Female	34	General Physician	7	Private

According to the participants' demographics, six of the fifteen respondents were between 30 and 35, three between 36 and 40, two between 41 and 45, and one between 46 and 50. The sample included two eye specialists, three physiotherapists, two orthopaedic specialists, and four dentists, as well as four general physicians. Years of employment ranged from three to ten years. Overall, the participants represented a diverse group of healthcare professionals with varying ages, specializations, and experience levels.

5. Data Analysis

The data analysis for this study focused on examining the responses collected through semi-structured interviews with doctors from public and private hospitals in Islamabad and Rawalpindi. The analysis aimed to identify recurring themes related to AI use in clinical practice, including perceived usefulness, ease of use, ethical concerns, trust, and adoption intentions. Researchers used thematic coding and interpretive analysis to explore how AI tools influence documentation, research summarization, clinical reasoning, and overall workflow efficiency. This approach provided a comprehensive understanding of doctors' experiences and perceptions, highlighting both the facilitators and barriers to AI adoption in the Pakistani healthcare context.

5.1 Understanding and Awareness of AI in Healthcare

Understanding and awareness of Artificial Intelligence (AI) in healthcare reflect how medical professionals perceive the presence, function, and relevance of digital tools within their clinical environments. In contemporary medical practice, doctors' awareness is shaped by professional exposure, educational training, institutional environment, and the growing use of AI applications in daily practice. Across specialties, awareness is practical, evolving, and context-dependent, often developed through hands-on engagement, professional interactions, and necessity. Many participants emphasised that their awareness of AI was shaped primarily through hands-on experience rather than formal theoretical learning. For instance, one participant reflected on learning to use AI during clinical case documentation in the final stages of professional studies:

"For me, AI became familiar during the last stages of my professional studies in 2023–2024, when we were constantly asked to document clinical cases and produce structured reports. I realized that AI could reduce the time spent on editing, translating, and formatting. Instead of spending my energy on typing, I could focus on understanding the child's condition and planning appropriate interventions. So my awareness of AI mainly comes from using it in ways that directly strengthen my clinical reasoning, not from reading definitions in books."(Sara, Personal Interview, November 10, 2025)

This illustrates that practical use during studies was a key source of AI awareness. AI served as a time-saving tool, allowing the participant to focus on patient understanding and intervention planning, demonstrating that awareness often stems from experience-based learning rather than abstract theoretical knowledge.

In addition to experiential learning, some participants developed their understanding of AI through professional exposure and engagement with global trends. An eye specialist described how conferences and research forums contributed to conceptual awareness:

"As an eye specialist, my awareness of AI grew through international conferences and research forums. Everywhere, experts were discussing how AI analyzes massive datasets, compares hundreds of clinical studies, and helps identify patterns that we may easily overlook. So I see AI as a system that processes information in ways humans cannot, and that understanding really shaped how I think about its role in clinical decision-making. It is not just a new technology; it is becoming part of modern medical thinking."(Sana, Personal Interview, November 10, 2025)

This participant's account highlights that awareness can also be knowledge-driven and analytical, with AI perceived as a powerful tool for processing data and supporting clinical decision-making. Such conceptual understanding complements the hands-on, experiential learning observed in other contexts.

Similarly, participants who started clinical practice during house jobs described learning AI through direct application in patient care:

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"When I started my house job, I did not learn about AI from books or teachers; I learned by using it. Whenever I had a confusing case, I would ask AI about possible assessments, special tests, or rehab protocols. Over time, I developed a sense of how AI thinks and how it structures information. So my awareness is rooted in hands-on experience, rather than theoretical training. It became like a quick reference guide that helped me organize my clinical thoughts." (Rida, Personal Interview, November 11, 2025)

This emphasizes that experiential engagement in clinical environments allows AI to become a practical support system. Repeated use helps participants understand how AI organizes information and guides clinical reasoning, reinforcing the pragmatic dimension of awareness. Moreover, the role of necessity in busy clinical settings was highlighted by participants working in high-demand environments:

"My understanding of AI has grown slowly, mostly because the healthcare system around us is changing. In busy clinical environments where we deal with heavy patient loads and limited time, AI becomes a source of support. I became aware of its potential not through formal workshops but through necessity, whenever I needed to summarize evidence, generate patient goals, or draft reports quickly, AI seemed to offer a reliable starting point. This repeated exposure shaped my awareness far more than any formal training." (Ayesha, Personal Interview, November 18, 2025)

Practical pressures and workload demands encourage doctors to adopt AI, gradually shaping their familiarity and trust in the tool. Awareness, in this sense, is incremental and driven by real-world needs.

Overall, doctors perceive AI as a supportive extension of their clinical work, enhancing reasoning, organizing information, and efficiency rather than replacing professional expertise. Awareness is shaped by a combination of experience, professional exposure, and practical necessity, making it gradual, evolving, and closely connected to everyday medical practice.

5.2 Perceived Usefulness of AI in Clinical Practice

Perceived usefulness reflects how doctors interpret the practical value of AI in improving medical work, enhancing diagnostic clarity, reducing clinical workload, and supporting treatment planning. For many practitioners, usefulness is closely tied to efficiency. AI becomes meaningful when it simplifies tasks, saves time, supports reasoning, and offers new insights that would otherwise require extensive effort. Its usefulness is therefore experienced in concrete clinical actions rather than theoretical performance.

Participants described AI as particularly valuable for streamlining clinical documentation, generating smart goals, suggesting intervention plans, summarizing complex research, and offering diagnostic direction. Doctors emphasized that AI helped manage high patient loads by providing quick access to structured information. Physiotherapists, for example, highlighted AI's role in reorganizing rehabilitation protocols and recommending exercises. Importantly, all participants stressed that usefulness is **supportive rather than substitutive**: AI helps clarify thinking and organize work but does not replace professional clinical reasoning.

One participant reflected on how AI improves workflow and task management:

"For me, AI's usefulness comes from the way it simplifies tasks that would normally take an hour or more. When I have several patient reports to write, AI helps me structure them, organize their goals, and even rephrase medical terminology into professional language. It does not replace my judgment, but it provides a clean, organized draft upon which I can build my clinical reasoning. That makes my overall workflow faster and more focused." (Sara, Personal Interview, November 10, 2025)

Although Participant emphasizes that AI is a practical assistant in managing routine tasks, allowing clinicians to dedicate more energy to reasoning, planning, and direct patient care, the structured outputs of AI reduce mental load and increase efficiency.

Another participant described AI's role in research summarization and staying updated:

"I find AI extremely useful when I need to read new research or understand recent studies in ophthalmology. Instead of going through thirty pages of a dense scientific paper, I can get a summarized explanation that highlights the key findings. This allows me to make more informed clinical decisions. AI helps me stay updated in a field where new information is constantly emerging, and without it, staying current would be very time-consuming." (Huda, Personal Interview, November 18, 2025)

This account highlights AI's usefulness beyond documentation, supporting knowledge management, evidence-based practice, and timely **decision-making**. By condensing complex research into actionable

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summaries, AI enables doctors to remain current in fast-evolving medical fields without spending excessive time on reading.

Similarly, a physiotherapist shared:

"One major use for me is documentation. AI helps me summarize long patient histories, arrange rehabilitation steps in proper order, and convert my rough notes into well-written clinical reports. When I am tired or overloaded, it becomes like an assistant that organizes information for me so I can focus on what actually matters, examining the patient, planning treatment, and making clinical decisions." (Saima, Personal Interview, November 16, 2025)

This highlights AI's role in time management and workflow **optimization**, particularly during periods of high clinical demand. By reducing cognitive and administrative burden, AI enables healthcare professionals to focus on tasks that require human judgment and critical thinking.

In general, doctors view AI as an invaluable tool that improves productivity, streamlines paperwork, aids in decision-making, and handles complicated data. Rather than replacing therapeutic experience, its value is found in enhancing human labour. AI is most beneficial when there is a heavy workload, complex cases, and research-intensive practice. In these scenarios, AI serves as a practical collaborator, improving clarity, saving time, and assisting with evidence-based patient care.

5.3 Ease of Use and Accessibility

Ease of use and accessibility relate to how confidently and comfortably doctors can operate AI tools within their daily routines. This includes their level of digital literacy, familiarity with smartphones and online platforms, and ability to navigate AI interfaces without difficulty. User-friendly solutions are beneficial in hectic clinical settings, where multitasking, time constraints, and heavy workloads are commonplace. Participants generally agreed that AI platforms are simple to use and require minimal technical skills. However, they stressed that simplicity alone does not translate into clinical reliability. AI may be easy to operate, but it still demands a high level of professional judgment, critical evaluation, and contextual understanding to ensure safe application in healthcare settings. Many participants also believed that institutional guidance and training would strengthen both usability and responsible adoption.

One participant stated:

"AI is straightforward to use; even non-technical people can utilise it just like they would a smartphone or a basic search engine. The challenge is not in operating the tool but in understanding how to filter and critically assess the information it gives. Many people copy-paste outputs without editing, and that is where the danger begins. So yes, it is accessible, but it must be used with a trained and critical mind." (Sana, Personal Interview, November 19, 2025)

Accessibility and user-friendliness are important, but professional judgment is essential. The participant highlights that the real difficulty lies not in operating the tool but in interpreting and refining the information it produces. Ease of use may lead to overconfidence, encouraging clinicians to rely too heavily on AI outputs without adequate verification.

Another participant added:

"I personally find AI user-friendly because the interface is conversational. I can ask it anything from exercise protocols to documentation formats, and it responds immediately. However, just because it is easy does not mean everything it says should be accepted. Ease of use should go hand in hand with professional judgment; otherwise, clinicians may become careless in verifying information." *(*Rimsha, *Personal Interview, November 20, 2025)*

Ease of use facilitates workflow, but cannot replace critical thinking. The participant appreciates the smooth, conversational interface that increases efficiency, but emphasises the necessity of cautious participation. Clinicians must maintain an evaluative mindset to avoid mistakes; user-friendliness alone cannot protect against false information.

A third participant emphasized institutional support:

"In terms of accessibility, what would help even more is if hospitals provided their own AI software. Free AI tools are easy to use, but they are not always accurate. A hospital-based system would ensure proper training, better results, and safer data handling. Ease of use becomes meaningful only when accuracy and reliability are also present." *(Sara, Personal Interview, November 10, 2025)*

True accessibility requires reliable, secure systems and proper training, demonstrating that ease of use is intertwined with accuracy and oversight. The participant connects accessibility to institutional responsibility, suggesting that user-friendly tools must

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also meet professional standards for data protection and clinical precision.

In general, doctors thought AI was very accessible and straightforward to incorporate into daily work because of its user-friendly interfaces. However, they repeatedly stressed that ease of use should not overshadow the need for clinical judgment, verification, and ethical responsibility. Accessibility becomes truly meaningful when combined with accuracy, institutional training, and secure systems that support safe clinical practice. Thus, while AI's user-friendliness is valuable, its practical use ultimately depends on the clinician's expertise, critical thinking, and the structured support of healthcare institutions.

5.4 Ethical and Privacy Concerns

Ethical and privacy concerns encompass a wide range of risks associated with entering patient data into AI systems, including issues of confidentiality, data security, fairness, biased outputs, diagnostic errors, and medico-legal liability. Across interviews, participants consistently identified ethics and privacy as some of the most sensitive and anxiety-producing aspects of AI use in clinical settings. The extensive use of public, non-institutional tools that lack regulatory oversight and pose unknown threats to data storage and access exacerbated these concerns. Doctors have frequently stressed that although AI may have clinical benefits, these benefits are outweighed by concerns about the processing, security, and potential misuse of patient data.

One participant reflected:

"Even though AI is helpful, the biggest issue for me is patient privacy. When we are in a rush, we often copy patient histories directly into the tool without removing names or personal details. This creates a huge ethical dilemma because we do not know where that data is going, how it is stored, or who might access it. So while AI helps us, it also puts us in a risky position regarding confidentiality." *(Kina, Personal Interview, November 18, 2025)*

This quotation demonstrates how routine clinical stresses, such as workload and time constraints, can lead to inadvertent confidentiality violations. The participant highlights the moral conflict between efficiency and patient safety by expressing profound uncertainty about data flows and storage procedures. The dilemma arises because doctors cannot verify whether AI systems safeguard sensitive information, raising concerns about long-term consequences and violations of professional codes of conduct.

Another participant described concerns about accountability:

"Another ethical problem is that AI sometimes gives diagnoses that are too severe or completely unrelated. If a practitioner blindly follows those suggestions, the patient may suffer. Moreover, legally, the responsibility will always fall on the doctor, not on the AI. That is why I believe AI should never be used without careful verification. The system has potential, but ethically it still lacks accountability." *(Javeria, Personal Interview, November 25, 2025)*

This statement emphasizes the medico-legal responsibility and the absence of accountability within AI systems. Doctors remain fully responsible for patient outcomes, even when errors originate from algorithmic suggestions. The participant highlights the potential harm caused by inaccurate or exaggerated outputs, warning that without human verification, AI could lead to misdiagnosis or inappropriate treatment. Ethical safety, therefore, depends heavily on clinicians' ability to critically evaluate AI-generated information.

A third participant focused on system security:

"We use age, gender, disease details, and sometimes full clinical descriptions when using AI. Even if we protect the patient's name, the remaining data may still be sensitive. In a country like ours, where digital security is weak, the fear of data leakage is very real. So ethical comfort depends on how secure the AI system actually is."*(Saira, Personal Interview, November 16, 2025)*

This quotation highlights concerns about structural and national-level vulnerabilities. Even anonymized data can be identifiable when combined with specific clinical details, making doctors fearful of potential leaks in a low-security digital environment. The participant suggests that ethical comfort is tied not only to AI's design but also to broader infrastructural reliability, underscoring the necessity of trusted, locally governed platforms.

Overall, some of the biggest obstacles to integrating AI in clinical practice have been identified as ethical and privacy issues. Doctors worry that unregulated platforms, inadequate national cyber-security systems, and unclear data-handling procedures could

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jeopardise patient privacy and put practitioners at risk both legally and professionally. They also stressed that an additional ethical challenge arises from AI's lack of accountability and the possibility of erroneous or deceptive results. Participants emphasised the necessity of hospital-controlled, encrypted, and regulated systems, as well as explicit instructions guaranteeing responsible use and comprehensive verification, for the safe adoption of AI. In this regard, ethical protection becomes a fundamental prerequisite for any significant and reliable application of AI in healthcare.

5.5 Trust and Reliability

Trust and reliability capture the extent to which doctors feel confident in depending on AI-generated outputs for clinical reasoning and decision-making. Throughout the interviews, trust emerged as *highly conditional*, shaped by factors such as accuracy, clarity of explanation, transparency of reasoning, and stability of responses across different clinical queries. Doctors perceived AI as helpful but not dependable enough to replace human judgment, especially in situations that demand precision, clinical sensitivity, and accountability.

One participant said:

"I trust AI only when I already have some idea of the clinical picture. If I ask it something completely unfamiliar, the output is often too generic or medically weak. Sometimes when I challenge the model, it immediately agrees with me, which makes me doubt its confidence and accuracy. A tool that changes its stance so easily cannot be trusted blindly ***in healthcare."*** *(Taiba, Personal Interview, November 25, 2025)*

This quotation highlights that trust in AI is *conditional rather than absolute*. Doctors rely on their prior medical knowledge to filter AI suggestions, using the tool only when they can cross-verify the information. The participant's concern about the model's tendency to shift its stance or to agree too easily reflects a lack of epistemic stability, thereby reducing confidence in AI-generated recommendations.

Another participant stated:

"AI is good for giving direction, but it is not consistent. On one day, it provides a very detailed explanation, and on another day, it gives something incomplete or medically questionable. Because of this inconsistency, I use it mostly for brainstorming or exploring different perspectives. Real trust comes only from evidence-based clinical experience—not from AI predictions."(Adeela, Personal Interview, November 25, 2025)

Here, the participant emphasizes inconsistency as a significant barrier to trust. Fluctuations in the **depth** and accuracy of AI responses limit its reliability for formal clinical use. The doctor perceives AI as an exploratory tool rather than a dependable source, reinforcing that *medical trust is grounded in evidence-based practice and professional expertise*, not in the unpredictable behaviour of the model.

Overall, doctors viewed AI as a supportive, secondary tool rather than a trustworthy clinical authority. Trust in AI remained dependent on the doctor's own knowledge, cross-verification, and professional judgment, revealing the system's limited reliability in high-stakes medical contexts. Inconsistency, lack of accountability, and the model's tendency to shift positions weakened its credibility and prevented doctors from relying on it for definitive decisions. Consequently, while AI contributes value in brainstorming and broadening perspectives, human expertise remains the core foundation of clinical reasoning and safe medical practice.

5.6 Adoption Intentions and Future Use

Doctors' perceptions of the long-term importance of AI in their clinical practice and the circumstances in which they would feel comfortable incorporating it more thoroughly are captured by adoption intentions. Across interviews, doctors showed a cautious openness toward future adoption. Expectations of safety, institutional responsibility, data protection, and regulatory monitoring were closely linked to their willingness. They saw AI as a tool that should be developed under stringent ethical and professional standards rather than as an inevitable successor. This theme highlights a future-oriented approach in which doctors imagine AI as a structured, secure, and clinically guided technology, rather than an unregulated digital assistant.

One participant said:

"I definitely plan to continue using AI because it helps me organize my thoughts and saves time, but only to a certain extent. AI should support the doctor, not

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replace the doctor. If we rely on it completely, our clinical reasoning skills will weaken, and that is dangerous for the profession. So I see AI as a useful partner, not a primary decision-maker." *(Tehreem, Personal Interview, November 27, 2025)*

This argument demonstrates that adoption is contingent upon upholding the importance of human knowledge. While acknowledging the valuable benefits of AI efficiency, clarity, and support, the participant cautions against becoming overly dependent on technology, as this could compromise fundamental clinical skills. A preference for collaborative integration, in which doctors continue to remain the primary decision-makers and AI supplements rather than replaces their expert judgement, is reflected in the emphasis on AI as a "partner."

Another participant emphasized institutional infrastructure:

"For AI adoption to be safe, every hospital should develop its own secure AI platform. We should not rely on public tools where data is exposed and accuracy is uncertain. If hospitals provide training and access to professional AI software, then the system will become much safer and more effective. Without institutional support, adoption will always remain limited." *(Sama, Personal Interview, November 20, 2025)*

This quote emphasises the importance of system-level change and organisational accountability. The participant draws attention to issues with accuracy, patient confidentiality, and the dangers of using unregulated public venues. For safe and long-term adoption, institutional AI systems are crucial, directed by supervision procedures, privacy regulations, and training. Doctors view the employment of AI as hazardous and disjointed in the absence of organised hospital support.

Overall, doctors show an optimistic yet cautious orientation toward AI adoption, welcoming it as a helpful adjunct that can streamline tasks, expand perspectives, and enhance decision-making efficiency. However, their willingness is tied to strong regulatory frameworks, secure data environments, professional training, and ethical governance. They envision a future where AI is formally embedded into healthcare systems but remains carefully controlled to preserve clinical reasoning, safeguard patient privacy, and maintain professional autonomy. Thus, AI is accepted as a collaborative clinical ally, valuable and supportive, but never a replacement for expert medical judgment. Doctors' experiences with AI in healthcare reveal a nuanced balance between awareness, usefulness, ease of use, ethical considerations, trust, and adoption intentions. Awareness is shaped by hands-on experience, professional exposure, and practical necessity, while usefulness is recognized in enhancing efficiency, organizing documentation, supporting decision-making, and saving time. Ease of use is generally high, but critical evaluation, professional judgment, and institutional support are essential. Ethical and privacy concerns, particularly regarding confidentiality, data security, and accountability, remain significant barriers. Trust in AI is conditional and limited, with reliance primarily for preliminary insights rather than authoritative decisions. Finally, adoption intentions are positive when AI is regulated, secure, accurate, and institutionally supported, allowing it to function as a collaborative tool that complements, rather than replaces, professional expertise. Collectively, these themes highlight that AI in clinical practice is **valued as a supportive and practical resource**, but its integration requires careful oversight, ethical safeguards, and ongoing professional engagement.

6. Discussion

Artificial Intelligence (AI) in healthcare is revolutionising clinical practice globally by improving administrative efficiency, decision-making, and diagnostic accuracy. (Russell & Norvig, 2021; Mei et al., 2020). However, adaptation in developing countries like Pakistan remains limited due to infrastructural constraints, ethical concerns, and variable professional readiness (Khan et al., 2024; Khalid et al., 2025). Designing interventions that encourage adoption while guaranteeing patient safety and professional accountability requires an understanding of how physicians view and interact with AI. This study explored doctors' lived experiences with AI using an interpretative phenomenological approach, revealing six interrelated themes that shape adoption patterns.

Awareness of AI is a prerequisite for adoption, as it shapes perceptions of relevance and usefulness (Tariq et al., 2025; Russell & Norvig, 2021). Existing literature suggests that awareness emerges from formal

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education, professional exposure, and hands-on experience (Huang et al., 2024). Participants in this study reported that their understanding of AI developed primarily through practical experience, including documentation, research summarization, and clinical decision support, rather than formal theoretical instruction. Physiotherapists learned to plan rehabilitation programs using AI, while ophthalmologists cited international conferences as shaping their conceptual understanding. These findings confirm that awareness in Pakistan is experiential, evolving from daily interactions rather than structured learning.

Perceived usefulness (PU) refers to the extent to which users believe a technology enhances job performance (Davis, 1989; Chuttur, 2009). Globally, AI has been shown to improve diagnostic accuracy, reduce administrative burdens, and facilitate evidence-based decision-making (Mei et al., 2020; Bello et al., 2025). Participants emphasized that AI is beneficial for streamlining clinical documentation, summarizing research, generating intervention plans, and organizing patient data. Usefulness was perceived as supportive rather than substitutive: AI helps clarify clinical reasoning but does not replace the clinician's expertise. This aligns with literature emphasizing AI as an augmentation tool rather than a replacement (Amann et al., 2020).

Ease of use (PEOU) reflects the effort required to operate technology (Davis, 1989). Prior research shows that user-friendly interfaces, combined with digital literacy and proper training, facilitate adoption, whereas complex systems hinder uptake (Hussain et al., 2024). Participants generally found AI intuitive and accessible, especially for those comfortable with digital tools. However, they highlighted the need for formal training to critically evaluate outputs, ensure accuracy, and use AI ethically. Hospital-provided training and institutionally managed AI platforms were suggested to enhance both usability and professional confidence. This emphasizes that ease of use is influenced not only by interface design but also by knowledge, skills, and support structures.

Ethical and privacy considerations are pivotal in healthcare AI adoption (Amann et al., 2020; Tapura et al., 2024; Umer et al., 2023). Concerns about patient confidentiality, data security, diagnostic accuracy, and medico-legal responsibility can inhibit use. Participants expressed anxiety about entering sensitive patient data into AI systems, notably public platforms. They emphasized the need for secure, hospital-approved AI systems and informed patient consent. These findings align with the literature, which highlights that ethical comfort is essential for adoption (Doraiswamy et al., 2019).

Trust is essential for clinicians to rely on AI outputs (Amann et al., 2020; Hussain et al., 2023). Transparency, consistency, and evidence-based performance are key determinants of trust. Doctors in this study reported conditional trust: AI was useful for brainstorming or preliminary guidance, but could not replace clinical judgment. Inconsistent responses and overly agreeable outputs reduced confidence. Trust increased when outputs could be cross-verified and when institutional safeguards were in place. This confirms that trust acts as a critical moderator, influencing whether perceived usefulness and ease of use translate into actual adoption.

Behavioural intention to adopt AI depends on perceived usefulness, ease of use, trust, and ethical comfort (Chuttur, 2009; Hussain et al., 2024). Participants expressed willingness to continue using AI, provided it is supportive, institutionally integrated, and accompanied by training and safeguards. Overreliance was discouraged to prevent erosion of clinical reasoning skills. Adoption, therefore, is contingent on individual perceptions, professional competence, and institutional infrastructure.

The findings support TAM's core constructs: perceived usefulness (PU) and perceived ease of use (PEOU) drive behavioural intention. However, in the context of Pakistani healthcare, additional factors, such as trust, ethical considerations, and training, emerge as critical moderators. Training enhances ease of use and fosters trust, while ethical safeguards ensure safe adoption. The study demonstrates that TAM's explanatory power is strengthened when contextual and socio-professional factors are considered, highlighting the need for a holistic, context-sensitive approach to AI adoption in developing country settings.

7. Limitations

This study's findings are based on a small purposive sample from select hospitals in Islamabad and

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Rawalpindi, which may limit generalizability. Experiences of doctors in rural or under-resourced settings may differ significantly. Furthermore, as the study relied on self-reported experiences, social desirability bias may have influenced responses. Future research could include larger, geographically diverse samples and explore patient perspectives on AI-mediated care.

8. Conclusion

This study explored doctors' perceptions and experiences of using Artificial Intelligence (AI) in clinical practice in Pakistan. Findings indicate that AI is perceived as a supportive extension of clinical work, enhancing efficiency, organization, and decision-making, rather than replacing human expertise. Doctors' awareness and understanding of AI are shaped primarily by hands-on experience and professional exposure, while perceived usefulness and ease of use influence their willingness to engage with AI. However, adoption is constrained by ethical concerns, privacy risks, and limited trust in AI outputs. Participants emphasized that secure, institutionally managed AI platforms, professional training, and safeguards for patient confidentiality are essential for safe and effective use.

The study contributes to the Technology Acceptance Model (TAM) by demonstrating that, in healthcare contexts, perceived usefulness and ease of use are necessary but insufficient determinants of adoption. Trust, ethical considerations, and institutional support act as critical moderators, shaping doctors' behavioural intentions. These insights highlight the importance of context-sensitive strategies to facilitate AI adoption in resource-limited healthcare systems such as those in Pakistan. Overall, AI holds significant potential for improving clinical practice, but its integration must be carefully managed to ensure professional, ethical, and patient-centered outcomes.

9. Practical Implications

The findings suggest several practical strategies for facilitating AI adoption in Pakistan:

Hospitals should implement secure, internally managed AI systems to safeguard patient data and ensure reliability.

Continuous professional training programs can enhance doctors' digital literacy, critical evaluation skills, and safe usage practices.

Clear ethical frameworks, including policies on data privacy, medico-legal accountability, and AI governance, can help alleviate ethical concerns associated with AI integration.

Trust-building measures, such as involving clinicians in the design of AI systems, ensuring transparency in algorithmic processes, and demonstrating evidence-based outputs, can further strengthen confidence in AI technologies.

Emphasizing AI as a supportive tool rather than a replacement for clinical reasoning ensures that its use aligns with professional identity, ethical standards, and the practical realities of medical practice.

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