

---

## Investigating The Role of Ai in Improving Patient Doctor Communication and Shaved Decision-Making

Saira Khurram<sup>1</sup>, Ayesha Ahmed<sup>2</sup>, Bushra Matloob<sup>3</sup>

<sup>1</sup> An Emerging Research Scholar From Pakistan, Gaining Recognition Both Nationally and Internationally for Her Contributions in Biological Sciences, Psychology, and Education.

<sup>2</sup> A Dynamic Young Leader Whose Achievements Reflect A Unique Blend of Academic Excellence.

<sup>3</sup> An Accomplished Young Professional Whose Journey Reflects A Dynamic Blend of Scientific Excellence, Leadership, and Digital Innovation.

DOI: <https://doi.org/10.70670/sra.v3i4.1255>

### Abstract

In Pakistan's healthcare system, the integration of artificial intelligence is beneficial in patient-doctor communication and in patient-doctor shared decision-making processes. Using a modified research methodology, the researchers carried out a systematic literature review of 45 peer-reviewed articles published in PubMed, Google Scholar, and Pakistan Journal of Medical Sciences, in the 2015 to 2024 timeframe. Primary data included semi-structured interviews from 30 healthcare professionals and 50 patients in major hospitals in Lahore, Karachi, and Islamabad, as well as the analysis of 100 psychotherapy transcripts comparing AI-assisted and traditional methodologies. AI assisted psychotherapy consultations demonstrated positive outcomes as patient comprehension ratings increased by 47% and satisfaction ratings increased 38% alongside enhanced shared decision-making during consultations. The duration of consultations was 44% longer increasing the exchange of information. The qualitative analysis of the transcripts culminated in six predominant themes which were easy access to information, patient empowerment, time management, trust, cultural sensitivity, and confidentiality. Compared to traditional healthcare methodologies, participants demonstrated a positive perception of AI assisted psychotherapy consultations but were apprehensive on the integration of AI into their professional workflow. The study concluded that AI technologies can transform patient-doctor interactions in Pakistan; however, successfully implementing AI technologies requires tools that have been adapted favorably to the culture, trained personnel, infrastructural investments, and AI as a substitute to assist rather than replace human judgement in clinical decision making.

**Keywords:** Healthcare System, Integration, Artificial Intelligence, Patient-Doctor Communication, Decision-Making.

### Introduction

Effective communication is an integral and fundamental pillar in the provision of quality care in health care systems all over the world. However, the health care systems in Pakistan a characterized communication problems and the inequity in the provision of care services. Pakistan is a country of more than 240 million people, and it has a statistically 1 doctor for every 1000 patients (Younas et al., 2023). Doctors are unable to afford quality consultations and interactions with patients. The problem is exacerbated by the country's cultural and sociological dimensions. In the past, communication through the use of technology in health care systems was looked down upon. However, the past few years have seen the advent and use of Artificial Intelligence powered programs to ease communication problems and provide systems pertinent to the provision of health care. AI powered communication and technology systems are pertinent to the provision of health of patients by helping patients make

decisions relating to health systems by better understanding their problems (Rizzolo et al., 2022). Due to its emphasis on patient autonomy and collaborative care approach, the health stakeholders and patient care partnerships have generated cross sector interest in health shared decision making and it complements patient autonomy with alive and cross sector collaborative care approach partnerships with patient and health stakeholders (Malik et al., 2022). In Pakistan health care system integrated shared decision-making lack as there lack of time and a hierarchical system with a paternalistic system of care in which physician makes decisions and patient is left out of the decision as there is lack of communication and awareness in the patient. The use of AI in clinical consultations has the potential to make health care interactions more equitable by giving patients more information, improving communication, and assisting physicians in simplification of complex messages. AI is able to answer patient questions and provide information in a variety of languages. AI can also provide a framework for a conversation to ensure that important elements of care are addressed (Mayes & Adams, 2025). The healthcare system in Pakistan is organized in a framework of public and private healthcare services. Each has its own strengths and weaknesses. For instance, public hospitals are often underfunded, overburdened, and lack adequate advanced healthcare tools. On the other hand, while private healthcare hospitals are better equipped, a large subsection of the population cannot afford the costs. Incorporating AI technologies in healthcare has the potential to address deficiencies in resource allocation and the time needed to provide consultations without lowering the quality of consultations and maintaining the same standard of accuracy and consistency of information (Ashraf et al., 2025). There have been several recent efforts in the digital health sector in Pakistan, especially in relation to the healthcare services offered via telecommunications and electronic health records. However, the ability of AI technologies to increase the quality of patient and physician interactions and communications in the healthcare documentation and decision-making process has not been a focus of inquiry and deserves the attention of researchers in the field. The investigation of the application of AI technologies in healthcare within the particular socio-economic, political, and cultural environment of Pakistan will undoubtedly provide the country with opportunities to improve the provision of healthcare services (Khattak et al., 2023).

The rural population of Pakistan has sparse access to specialist healthcare, and AI-enabled communication tools have the potential to improve patient-provider interactions. As the research highlights, addressing the communication challenges in healthcare integration methods has the potential to improve patient-provider interactions. Accessibility, low-quality communication methods, and the inequity of distributed communication tools in healthcare systems have the potential to improve patient-provider interactions (Dayani et al., 2024). The population of Pakistan is multilingual, primarily speaking Urdu, English, Punjabi, Sindhi, and Pashto among others, highlighting the need for communication tools in healthcare systems designed to cross communication gaps. AI systems could deliver proper healthcare communication. Health literacy, and the varying degrees of it, and the inequitable distribution of socioeconomic status creates inequity in the ability of varying population groups to access and/or engage with the healthcare delivery system, highlighting a significant need for communication systems designed to be accessible for effective participation in healthcare delivery. AI communication systems that have a strong ability to simplify communication, that can alter their communication for the culture in a way that improves understanding, and that present clear, appropriately designed suggestions would have the potential to deliver the healthcare communication effectively to the broad population (Mahmood et al., 2024).

This study is the first of its kind to understand how several techniques can be applied from the field of Artificial Intelligence to advance the integration of Pakistan's health care systems. The study provides recommendations to health care comptrollers based on assessments of the current state of practice, barriers, facilitators, and the quality of AI augmented consultations in relation to communication and impactful patient outcomes. The study to be undertaken will advance the discourse on the impact of the digitally transformed health care systems of the developing world. The study will be culturally relevant. As Pakistan balances the development of its health care systems and the assimilation of modern technological systems, the needs will grow to understand AI's role on primary health system functions of communication and decision-making. The study is an assessment and is therefore timely

and relevant. The study aims to open the discourse on the impact of developing technologies on advanced patient centered care, and on health systems that seek to address equality in the health systems of patients and providers that can be more efficient. The study aims toward providing patient centered care to Pakistani patients and health care providers.

### **Research Objectives**

1. To understand the existing gaps in effective communication in patient-doctor communication and shared decision-making in the public and private health care systems of Pakistan, especially in the cities of Lahore, Karachi, and Islamabad.
2. To evaluate AI-enabled consultation tools' impact on the quality of communication, precision of data transfer, and patient understanding during medical consultations in Pakistani medical facilities.
3. To evaluate the attitude, acceptance, and experience of health professionals and patients concerning the use of Artificial Intelligence in medical consultation and in computerized decision making.

### **Research Questions**

1. What are the main communication challenges experienced in the Pakistani healthcare context during the interactions between patients and physicians, and how do these challenges influence the processes of joint decision-making?
2. What is the effect of AI-assisted consultations on the communication outcomes between patients and physicians, the duration of the consultations, and the satisfaction of the patients in comparison to traditional consultations methods?
3. What are the determinants of the AI acceptance and adoption by healthcare practitioners and patients in the vast and heterogeneous healthcare system of Pakistan?

### **Significance of The Study**

In the context of Pakistan's healthcare system, the ability of AI technologies to enhance doctor-patient interactions and facilitate shared decision-making is a valuable contribution to the limited empirical research on the potential benefits of this technology. Such information would provide an evidence base for the incorporation of AI-enabled communication tools that respect the nuances and sensitivities of patients' culture, to decision-makers, healthcare practitioners, and hospital administrators. Pakistani healthcare settings are characterized by a multitude of socio-cultural factors such as linguistic heterogeneity, low health literacy, and inadequate resources. The findings of this research would aid the development of cost-effective digital health technologies aimed at increasing healthcare access and improving the quality of care provided. In addition, the factors of measurement and experience, especially in the context of integrating AI technologies into healthcare systems, would provide the research with the motivation and knowledge to facilitate the creation of innovative systems for improving communication within healthcare systems. The recommendations that come from this study will improve the decision-making process that involves technology adoption based on evidence, as well as help close the divide between sophisticated AI and its implementation in the healthcare system in developing countries.

### **Literature Review**

The application of artificial intelligence in healthcare case has received global coverage in research, where experts focus on possible uses of diagnostic assistance, treatment options, and patient management. AI has proved to be useful in analyzing medical information, determining its value, and offering insights that help in gaining positive responses from the outcomes of medical decisions (Willmen et al., 2021). In the area of doctor-patient communication, researchers have studied the efficiency of AI in facilitating communication and understanding of medical information. In developed countries, AI has been designed to help in responding to medical questions, extract information from

patient queries, and create responses that help reduce disparities between healthcare access and information. In developed countries, research has shown that AI chatbots and virtual healthcare assistants are capable of triaging patients, offering initial advice, and preparing patients for doctor appointments. These tools are efficient in helping healthcare professionals respond to frequently asked questions and direct their cognitive skills toward more complex medical decisions that require human empathy (Rashid & Sharma, 2025).

Shared decision-making and patient-centered care go hand in hand and brings multiple benefits in health outcomes, treatment adherence and patient satisfaction, which has been documented in various studies. In these collaborative partnerships, patients, and healthcare providers, make treatment decisions by integrating clinical evidence with the patient's values, preferences, and circumstances. Nonetheless, shared decision-making has many challenges, especially in healthcare systems with hierarchies and short consultations (Bekker et al., 2023). Studies from many countries report common challenges including not enough time in consultations, physicians thinking they might overwhelm patients with information, patients having low health literacy, and cultural aspects that affect patients from actively participating in decision-making. More challenges arise in the South Asian context from the traditional doctor-patient relationship where the medical authority can be highly unquestioned and patients may feel tense to express preferences or ask questions. It has been documented that societal values which promote the medical expertise can restrict the scope of communication and engagement of patients in the treatment decisions (Bekbolatova et al., 2024).

The integration of AI into shared decision-making support has been explored in a growing body of literature, with some researchers focusing on decision aids and tools aimed at helping patients comprehend the treatment options available and the preferences they can articulate. AI-driven decision support tools can provide patients with personalized information, in layers, on treatment options, attainable goals, risks, benefits, and possible prospect outcomes, and in a format that patients with low health literacy can understand. These systems can customize communication modalities to the patients' profiles and utilize graphics, plain language, and interactivity to increase understanding (Hua et al., 2025). Patients who utilize AI decision support aids report being better informed about their condition, feeling more in control and confident in their decisions, and being more satisfied with their care. These tools can also improve information standardization, as all patients will have their questions answered and complete information will be relayed to them, irrespective of time limitations, varying communication styles of the physicians, and other information that may have been omitted. Researchers have also investigated the possibility of using AI to enhance patient-provider communication asynchronously, giving patients the opportunity to absorb information at their own pace and allowing them the time to prepare questions for the consultation or to use the time to clarify questions after the consultation (Emeriaud et al., 2023).

Communication in the healthcare system is extremely important, especially in multilingual countries. Previous studies have shown that language barriers between patients and healthcare providers contribute to misunderstandings, mistakes in taking medication, patients being dissatisfied, and overall worse health issues (Horváth & Molnár, 2022). In Pakistan, patients and healthcare workers come from different regions and speak different languages, which means that both sides have communication obstacles due to varying levels of English proficiency. Previous studies that focus on healthcare communication in multilingual contexts have praised the use of AI-powered translating devices that can interpret language in real-time. Over the last several years, several algorithms have been used to make significant technological progress in machine translation, particularly in neural machine translation, which is able to translate medical terminology and everyday language to a high degree of accuracy. Research on machine translation as a healthcare communication tool, however, stresses the importance of going beyond translation and tailoring the content to the target audience, as medical terminology and health beliefs in different languages are often imbalanced. In order to allow the effective exchange of medical information across borders, AI communication tools must accurately translate to culturally diverse and low-context communicators, including regional nuances and idioms (Minhas, 2024).

Incorporating AI education technologies in a clinic environment necessitates consideration of issues

surrounding trust, acceptance, and ethics in AI education technologies. The technology acceptance literature in healthcare indicates, in order to achieve acceptance of AI tools, healthcare providers and patients must see AI tools as beneficial, trustworthy, and congruent to their principles (Hosseini et al., 2023). The acceptance of AI tools in healthcare by providers depends on their perceived impact on clinical workflow, usability, and design of the solution. Lack of autonomy, identity of the profession, and workflow design are central to the acceptance of AI systems. Research indicates that AI tools that complement rather than substitute a physician's expertise and assist in the decision-making process, leaving the final decision to the physician, is better accepted. Trust in AI healthcare systems, privacy concerns, and preservation of the humanity in AI healthcare systems are important determinants of AI healthcare systems acceptance by patients. Research indicates that patients appreciate AI systems that enhance rather than constrain their engagement. Patients desire systems that not only engage them in the process of decision-making but also retain the human element in the interaction, and promote efficient engagement (Khreisat et al., 2024).

The impact of the integration of Artificial Intelligence in the communication sector of the healthcare system continues to demonstrate the positive effectiveness of the technology in varied settings. Specialized research in outpatient healthcare facilities concerning the use of Artificial Intelligence preliminary symptom checkers, and advanced questionnaires, has shown evidence of aiding in the improvement and efficient streamlining of the healthcare consultation process. The patients are compelled to express their healthcare challenges with greater clarity, while the doctors are able to obtain and organize the essential details with greater efficiency (Badawy, 2023). The communication enhancement deriving from the positive impact of such technologies on consultations, from the use of AI technologies, have shown improved consultation levels and decision-making processes. However, there are concerns of possible over-dependence on the technology, lack of personalization of the care, and the inequitable distribution of the technology to individuals with low technical capabilities. The positive impact of technologies in consultations and communication in the healthcare sector continues to showcase the advantages of such technologies, especially in developing world countries with limited resources concerning technology (Lee & Yoon, 2021).

### **Research Methodology**

This research sought to investigate AI as a tool to enhance patient and doctor communication as well as decision-making during a consulting session. The researchers adopted mixed method research design including a systematic literature review. The review period was restricted to peer-reviewed AI literature published in the 2015 to 2024 period. In the systematic review, the researchers focused on clinical AI communication and South Asia. Seventy-five studies were selected from a primary search on the Pakistan Journal of Medical sciences, PubMed, and Google Scholar, where the researchers used the keyword search “artificial intelligence, patient-doctor communication, and shared decision-making.” Primary data collection-through- semi-structured interviews- comprised 30 healthcare workers and 50 patients from three of the largest hospitals in Lahore, Karachi, and Islamabad, where the patients had AI consultations. The researchers employed purposive sampling to achieve a balanced representation from the public and the private health sectors, different branches of medicine, and various socioeconomic levels. The researchers also reviewed 100 transcripts of clinical consultations. The consultations were in Urdu and English, with the aim of describing clinical consultations with the use of AI and those which were without the use of AI. The researchers used thematic analysis to assess the quality of the communication, the decision-making and overall satisfaction of the patients, critically situated in Pakistan. Length of consultation, completeness of information exchanged, level of information retained by the patients, and the degree of cultural adaptation to the instruments measuring these variables were used to assess the quantum of the decision. The researchers practiced ethical adherence by getting institutional review board approvals from the hospitals that were taking part in the study, alongside acquiring informed consents from all study participants, whose consent forms were provided in Urdu and English.

## Results and Data Analysis

### Quantitative Analysis

The quantitative analysis examined data collected from 100 clinical consultations, comparing outcomes between AI-assisted and traditional consultation approaches. Statistical tests were conducted using SPSS software to determine significant differences in communication quality, consultation duration, and patient satisfaction. The analysis included 50 consultations conducted with AI support tools and 50 traditional consultations without technological assistance. Demographic data revealed that participants represented diverse age groups, educational backgrounds, and socioeconomic statuses, ensuring the findings' applicability across Pakistan's heterogeneous population.

**Table 1:** Comparison of Consultation Duration and Information Exchange

Metric	AI-Assisted (n=50)	Traditional (n=50)	t-value	p-value
Mean Consultation Duration (minutes)	12.4 ± 2.1	8.6 ± 1.8	9.87	<0.001
Information Points Covered	18.7 ± 3.2	11.3 ± 2.9	12.34	<0.001
Patient Questions Asked	6.8 ± 2.1	3.2 ± 1.4	10.21	<0.001
Doctor Explanations Provided	14.2 ± 2.8	8.9 ± 2.3	10.45	<0.001

Table 1 demonstrates significant differences between AI-assisted and traditional consultations across multiple communication metrics. AI-assisted consultations averaged 12.4 minutes compared to 8.6 minutes for traditional consultations, representing a 44% increase in consultation time. Despite longer durations, participants reported greater satisfaction with the depth of information provided. The number of information points covered during AI-assisted consultations was significantly higher, with an average of 18.7 points compared to 11.3 in traditional settings. Patients in AI-assisted consultations asked nearly twice as many questions, indicating increased engagement and comfort in seeking clarification. Similarly, doctors provided more explanations when supported by AI tools, suggesting that technology facilitated more comprehensive information delivery.

**Table 2:** Patient Comprehension and Satisfaction Scores

Measure	AI-Assisted (n=50)	Traditional (n=50)	t-value	p-value
Comprehension Score (out of 20)	16.8 ± 2.1	11.4 ± 2.8	11.02	<0.001
Satisfaction Score (out of 10)	8.7 ± 1.2	6.3 ± 1.8	8.12	<0.001
Confidence in Treatment Plan (out of 10)	8.4 ± 1.4	6.1 ± 1.9	7.24	<0.001
Perceived Involvement in Decision-Making (out of 10)	8.1 ± 1.6	5.4 ± 2.1	7.58	<0.001

Table 2 reveals substantial improvements in patient comprehension and satisfaction when AI tools supported consultations. Patient comprehension scores, measured through post-consultation assessments testing understanding of diagnosis, treatment options, and care instructions, showed marked improvement with AI assistance. The mean comprehension score of 16.8 out of 20 in AI-assisted consultations compared to 11.4 in traditional consultations represents a 47% improvement. Overall satisfaction scores were significantly higher for patients who experienced AI-supported consultations, averaging 8.7 out of 10. Patients also reported greater confidence in their treatment

plans and stronger feelings of involvement in decision-making processes, indicating that AI tools effectively promoted shared decision-making principles.

**Table 3:** Healthcare Professionals' Perceptions of AI Tools

Aspect	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
AI improves communication clarity	43%	37%	13%	7%	0%
AI saves time in consultations	23%	30%	27%	17%	3%
AI helps explain complex concepts	47%	33%	13%	7%	0%
AI maintains doctor-patient rapport	20%	33%	30%	13%	4%
Would recommend AI adoption	37%	40%	17%	6%	0%

Table 3 presents healthcare professionals' perceptions regarding AI tools in clinical practice. The majority of doctors agreed or strongly agreed that AI improves communication clarity, with 80% expressing positive views. However, opinions were more divided regarding time-saving benefits, with only 53% agreeing that AI saves consultation time. This suggests that while AI enhances communication quality, the comprehensive information exchange may extend consultation durations. Most healthcare professionals acknowledged AI's effectiveness in explaining complex medical concepts, with 80% expressing agreement. Concerns about maintaining doctor-patient rapport were evident, with only 53% agreeing that AI preserves this essential relationship element. Overall, 77% of healthcare professionals would recommend AI adoption, indicating general acceptance despite some reservations about specific aspects.

**Table 4:** Patient Technology Acceptance and Barriers

Factor	Yes/High	Moderate	No/Low
Comfortable with technology in consultations	64%	26%	10%
Trust AI-provided information	58%	32%	10%
Previous experience with health technology	42%	18%	40%
Access to smartphones/internet	76%	14%	10%
Language preference supported by AI	82%	12%	6%
Privacy concerns about data sharing	18%	36%	46%

Table 4 illustrates patient perspectives on technology acceptance and potential barriers to AI adoption. The majority of patients expressed comfort with technology integration in medical consultations, with 64% reporting high comfort levels. Trust in AI-provided information was moderately high at 58%, though 32% remained uncertain, highlighting the need for ongoing education about AI reliability and limitations. Previous experience with health technology varied considerably, with 40% reporting no prior exposure, suggesting opportunities for familiarization initiatives. Encouragingly, 76% of patients had access to smartphones and internet connectivity, indicating infrastructure readiness for digital

health solutions. Language support emerged as a strength, with 82% confirming their language preferences were adequately supported. Privacy concerns were relatively low, with only 18% expressing high concern about data sharing, though 36% indicated moderate concern, emphasizing the importance of transparent data protection policies.

**Table 5:** Shared Decision-Making Components Assessment

Component	AI-Assisted Mean Score (out of 10)	Traditional Mean Score (out of 10)	Difference	p-value
Treatment options explained	8.6 ± 1.3	5.8 ± 1.9	2.8	<0.001
Risks and benefits discussed	8.2 ± 1.5	5.4 ± 2.1	2.8	<0.001
Patient preferences elicited	7.9 ± 1.6	4.8 ± 2.0	3.1	<0.001
Questions encouraged	8.4 ± 1.4	5.6 ± 1.8	2.8	<0.001
Joint decision reached	8.1 ± 1.5	5.2 ± 2.0	2.9	<0.001

Table 5 evaluates specific components of shared decision-making using the OPTION scale adapted for the Pakistani context. AI-assisted consultations scored significantly higher across all five essential components of shared decision-making. The explanation of treatment options improved by an average of 2.8 points, demonstrating AI's effectiveness in presenting multiple alternatives clearly. Discussion of risks and benefits showed similar improvement, suggesting that AI tools helped structure comprehensive information delivery. The largest difference appeared in eliciting patient preferences, with AI-assisted consultations scoring 3.1 points higher, indicating that technology created space for patient voice and choice. Encouragement of questions and reaching joint decisions also showed substantial improvements, confirming that AI integration promoted more collaborative and patient-centered consultation dynamics.

### Qualitative Analysis

#### Theme 1: Enhanced Information Accessibility

AI tools were noted by participants to improve accessibility and understandability of information. Simplification of language and ability to receive explanations in the user's chosen language was beneficial to patients. Respondents pointed out the usefulness of AI generated images and diagrams in their understanding of difficult parts and processes of the body and the treatment. Healthcare providers pointed out that AI's ability to deliver the same evidence-based information ensured standardization of information. Patients with lower levels of education especially appreciated the ability to review information and self-regulate their pace. The accessibility theme was prominent in both urban and rural participants, although metropolitan participants had a better level of initial technological interface.

#### Theme 2: Empowerment and Active Participation

The data clearly indicated that patients felt more empowered when AI tools were incorporated into their consultations and felt more confident in expressing questions and concerns and in participating in treatment decisions. Several patients noted that AI-generated summaries of their health conditions were helpful in formulating questions in advance of consultations. Health care providers noticed that patients who used AI tools came to their consultations with more knowledge to contribute to the

dialogue. This sense empowerment was even more evident among younger patients, especially those with chronic conditions that required ongoing management. Some older patients even reported feeling somewhat overwhelmed at first, but then reported feeling more confident with the technology in time.

### **Theme 3: Time Management Challenges**

Although AI uses improved overall communication, patients and doctors still noted the difficulties of time management. Increased time spent on consultations was a challenge for the healthcare community. On the other hand, a number of healthcare professionals pointed out that longer first consultations helped reduce the number of follow-up appointments and clarifications needed by the patients. Some healthcare professionals expressed experiencing a learning curve when it came to the use of AI tools in their workflows. Patients generally did not feel that the length of the consultation was an issue and appreciated a more thorough review of their issues. The theme demonstrated the challenges of balancing quality versus time within the workflows. In this aspect, the family doctors in the private sectors expressed more freedom regarding the length of consultations compared to the doctors in public hospitals where the patients' loads are much higher.

### **Theme 4: Trust and Technology Skepticism**

Trust emerged as a complex theme that spanned both faith in the reliability of AI data and worries that technology could usurp human thinking. Intermediation by a physician was vital, as most patients expressed trust in AI data. Older participants and rural respondents were more apprehensive toward technology in healthcare initially. AI's role in augmenting clinical judgment, rather than substituting it, was emphasized by healthcare experts for whom the automated recommendations were a source of concern. Trust was built, in part, by explaining the non-transparent and opaque nature of recommendations generated by AI, as well as outlining the aspects of the technology. The theme embraced the incremental approach with education, underscoring that both were needed in tandem to build trust.

### **Theme 5: Cultural and Linguistic Appropriateness**

Participants discussed the necessity of integrating culture and appropriate language when developing AI tools for the Pakistani context. Patients expressed appreciation for AI systems that integrated culturally appropriate references and medical information, and acknowledged local health beliefs. The inclusion of Urdu text and voice was considered a precondition for implementation. Healthcare professionals commented that AI tools need to factor in culture when considering treatment choices and health-seeking behaviors. A few respondents pointed out that some AI systems provided information that contradicted local medical practice, which was disorienting. The theme described the critical need to develop and adapt AI technologies to the Pakistani context rather than the unmodified implementation of systems developed in the West.

### **Theme 6: Privacy and Data Security Concerns**

While worries about privacy in general were modest, the discussions brought out some nuanced perspectives regarding data protection. Younger, urban patients were more aware regarding data privacy issues and the need to have stronger forms of data protection. Some participants felt uncomfortable having their health data stored in digital format and instead preferred analogue records. Health care professionals expressed concerns about the ability of organizations to prevent unauthorized access to sensitive patient records. Even so, many patients were willing to share data, provided that the benefits were clearly articulated and protection measures were in place. The theme highlighted the necessity to have transparent frameworks of data governance, and also the need to have patients' confidence that there are systems in place to protect their data.

### **Discussion**

This study shows the extent to which patient-doctor communication and shared decision-making can be enhanced by AI technologies tailored to the Pakistan healthcare industry. The outcomes of this

study indicate that AI-powered consultations were significantly better than the appreciation of the differences in the information exchanged, patient understanding and satisfaction, and the extent to which decisions were made jointly. The difference in patient understanding scores of 47% is significant and can lead to positive health outcomes due to improvement in treatment compliance. The qualitative portion of this research showed that patients experienced more empowerment and engagement and were in a position to overturn the traditional hierarchy in Pakistan healthcare systems when AI-powered tools supported their consultations. Implementation of AI-powered consultations in Pakistan healthcare systems is not without challenges, such as time, trust, and culture. The balance between the quality of the consultation and the time spent is a central issue in poorly resourced public hospitals. In the health care profession, a positive perception of AI technologies is often tempered by concerns regarding the smooth integration of technology and the preservation of therapeutic relationships, suggesting that the adoption of artificial intelligence technologies in health care is a complex problem that requires the proposal of innovative solutions that address the challenges of implementing AI in healthcare while also identifying and preserving the aspects of healthcare that require the full engagement of healthcare professionals. These results correspond to the results of other studies conducted in various parts of the world that show the potential of AI and the specific variables that affect the acceptance of AI in developing countries.

### **Conclusion**

This study shows that AI can help improve communication and shared decision making between patients and their healthcare providers in the context of Pakistan's diverse system of healthcare. This research used a mixed method approach to gather both quantitative and qualitative metrics to show that patients had better access to the information, understood it, and were more engaged and satisfied that AI tools improved information access. Patients reported an enhanced sense of participation and engagement in the decision-making process whereas healthcare providers recognized the assistance of AI in communicating complicated information and presenting it in a more uniform manner. Though, there are issues that need to be worked on in order to make AI tools more effective in system integration. These include a host of Time management issues, Trust building, Cultural issues, and System Infrastructure issues. The results show that AI is better used as a complement to human expertise, and much care needs to be taken to ensure that the AI does not compromise the human relationship between the healthcare provider and the patient. The results of the research are not only relevant to Pakistan, but also to other emerging economies in the world that are trying to find ways to harness technology to improve the healthcare system. The use of AI communication tools is a way to improve healthcare, lessen inequity, and deliver care that addresses the needs of the different cultures in Pakistan and is based on innovative technological processes.

### **Recommendations**

Healthcare organizations ought to adopt Artificial Intelligence technologies progressively while tailoring training to employees and patients to facilitate trust and build digital literacy. AI technologies need to be cross-culturally customized to offer multilingual support, consistent with local content, and provided with accessibility-design interfaces suited to users with varying tech proficiency. Policy-makers ought to construct regulations to govern clinical use of AI technologies with respect to privacy, security, and ethics. Public sector hospitals have a considerable gap in basic infrastructure, such as reliable internet and computing devices, which this gap must be addressed to provide equitable access to AI-assisted healthcare. More studies are needed to understand the long-term implications of AI-assisted consultations in Pakistan, the cost-benefit equation, and the factors that underpin the widespread adoption of successful AI-assisted consultations. The efforts of technology innovators, healthcare professionals and patients in Pakistan must be consolidated to help rapidly improve AI technologies in a way that is economically viable, compliant with the legal frameworks, and addresses the needs of the healthcare system.

## Authors Notes:

1. **Saira Khurram** is an emerging Research Scholar from Pakistan, gaining recognition both nationally and internationally for her contributions in Biological Sciences, Psychology, and Education. She has worked extensively in the private sector, serving at Roots IVY Educational Complex as a Program Leader and Subject Administrator, where she has led international qualifications including IGCSE, O-Level, A-Level, AQA, and Pearson Edexcel Biology. Alongside her teaching and leadership, she has consistently advanced her research career, producing impactful publications in renowned international journals.

Saira Khurram's research portfolio demonstrates excellence and global relevance. She has more than 25 publications and Some of her most cited publications include:

- Springer – Wireless Personal Communications
- ScienceDirect – Chemosphere
- EBSCOhost – Personal and Ubiquitous Computing
- Journal of Political Studies and Analysis (JPSA) – Pakistan
- IEEE Xplore
- Dialogues SSR
- Journal of Political Studies and Analysis (JPSA) – Article 176

Her academic influence is also reflected through Google Scholar citations, with contributions recognized by the Higher Education Commission (HEC) of Pakistan:

- HEC-recognized publication 1
- HEC-recognized publication 2
- HEC-recognized publication 3

Her Springer publication in Wireless Personal Communications is particularly notable, holding a strong ranking internationally and being cited by scholars across multiple countries. Through her teaching, curriculum leadership, and high-impact research, Saira Khurram continues to bridge the gap between academic scholarship and global innovation.

2. **Ayesha Ahmed** is a dynamic young leader whose achievements reflect a unique blend of academic excellence, scientific curiosity, social responsibility, and creative expression. With a consistent record of success in diverse fields—from science and sustainability to leadership and the arts—Ayesha stands out as a role model for her peers.

### **Academic and Scientific Engagement**

In February 2025, Ayesha gained hands-on laboratory experience through a prestigious internship at the National Institute of Biotechnology and Genetic Engineering (NIBGE). She trained in advanced techniques such as PCR, Microarray, and Gel Electrophoresis, equipping her with practical skills in molecular biology. Complementing her academic interests, Ayesha also served as Team Leader in the Eco Internship Program (June 2025). She spearheaded a community service initiative on natural resource conservation, climate action, and entrepreneurship, contributing over 30 hours of service. Her leadership culminated in a two-week welfare project, showcasing her ability to merge environmental advocacy with social impact.

### **Community Service and Social Advocacy**

Beyond the laboratory, Ayesha is deeply committed to public service. As an Ambassador for the Road Safety Initiative, she collaborated with Roots IVY and the Regional Traffic Police Department to raise awareness on crucial issues such as underage driving and traffic safety. She also founded BIOLENS, a CAS knowledge-intensive project, reflecting her dedication to combining research, education, and community development.

### **Leadership and Diplomacy**

Ayesha's leadership extends to the international debating and Model United Nations (MUN) community. She has earned prestigious titles, including the Best Delegate Award at GMUN

(2017 & 2023) and the Outstanding Diplomat Award at IVY MUN 2024, Lahore.

Her management and organizational experience is equally notable:

- Director Host Hospitality & ACD, RMUN 2023
- Chair UNODC, RIMUN 2024
- ACD UNSC, RIMUN 2025
- Director, Annual IGCSE Dinner

These roles reflect her ability to lead large teams, manage events, and engage in high-level discourse on global challenges.

#### **Personal Achievements and Creative Excellence**

Ayesha's creativity and academic brilliance shine through her accolades:

- Gold Medalist, National College of Arts Lahore, 13th ARTBEAT National Child Art Competition & Exhibitions
- Silver Medalist, IKLC 2023
- Bronze Medalist, ICATS Contest 2022
- Gold Medalist, HRCA Arts & Creative Writing Contest 2021
- Bronze Medalist, IKLC 2019
- Gold Medalist, HRCA Science & English Contest 2018–19

These achievements demonstrate her versatility across disciplines, from science and critical thinking to art and creative writing.

3. **Bushra Matloob** is an accomplished young professional whose journey reflects a dynamic blend of scientific excellence, leadership, and digital innovation. With a strong academic background in biotechnology and bioinformatics, she stands out as a driven researcher and leader dedicated to advancing scientific understanding, sustainability, and educational growth. Her career embodies a unique combination of curiosity, creativity, and commitment to community development.

#### **Academic and Research Engagement**

Currently pursuing a Master of Science in Bioinformatics at the National University of Sciences and Technology (NUST), Bushra continues to expand her expertise in computational biology and medicine. Building upon her Bachelor of Science in Biotechnology from Quaid-i-Azam University (QAU), she has developed a solid foundation in both experimental and computational research. At the Bioinformatics Lab, International Islamic University Islamabad (IIUI), where she worked as a Lab Assistant, Bushra gained hands-on experience in data modeling, computational analysis, and research documentation. Her work involved assisting in thesis drafting, proposal development, and the practical application of bioinformatics tools to real-world scientific questions.

Her scientific engagement extends into healthcare and sustainability. During her internship at Avicenna Medical Centre, DHA Islamabad, Bushra contributed to healthcare management and environmental health initiatives, supporting efforts toward sustainable medical practices and efficient community healthcare delivery.

#### **Leadership and Organizational Roles**

Bushra currently serves as the Vice President of SINES (School of Interdisciplinary Engineering & Sciences) at NUST, where she plays a pivotal role in leading student engagement, fostering research collaboration, and promoting interdisciplinary innovation. Her leadership has been instrumental in organizing events, workshops, and academic initiatives that bridge the gap between science and real-world impact. In parallel, she works as a Teacher at My Tutor Source (MTS) an international education platform where she provides personalized academic support to students, ensuring quality instruction and learner engagement. Her teaching approach integrates empathy, conceptual clarity, and technology-driven methods, allowing her to make complex scientific ideas accessible to learners of all backgrounds. she has helped students achieve admissions in prestigious universities like NYU,

YALE and Stanford. Her leadership journey began during her undergraduate years, where she served as Chief Executive and Media Coordinator of QALB at QAU, successfully executing seminars and workshops on biotechnology, sustainability, and scientific literacy. These experiences highlight her ability to manage large-scale projects and inspire others toward collective academic excellence.

#### **Technical and Digital Expertise**

Bushra complements her scientific training with strong digital fluency and technical skills. Proficient in Python, R-Studio, Microsoft Office Suite, Graphic Design, WordPress, and Website Development, she bridges the worlds of science and technology with creativity. Her certifications from NS Training in Graphic Design, WordPress, Fiverr, and Upwork further reinforce her digital versatility and entrepreneurial mindset.

#### **Awards and Recognition**

Bushra's dedication and academic excellence have been recognized through multiple Merit Scholarships from the Government of Pakistan Benevolent Fund and from IIUI. These awards underscore her consistent record of achievement and her commitment to continuous learning and professional integrity.

#### **References**

- Ashraf, S., Ashraf, Z., & Yaqoob, M. (2025). Comparative Analysis of the Health Care Systems of Pakistan and Nepal. *Journal of Health, Wellness, and Community Research*, e231-e231.
- Badawy, M. (2023). Integrating artificial intelligence and big data into smart healthcare systems: A comprehensive review of current practices and future directions. *Artificial Intelligence Evolution*, 4(2), 133-153.
- Bekbolatova, M., Mayer, J., Ong, C. W., & Toma, M. (2024). Transformative potential of AI in healthcare: definitions, applications, and navigating the ethical landscape and public perspectives. *Healthcare*,
- Bekker, H. L., Winterbottom, A. E., Gavaruzzi, T., Finderup, J., & Mooney, A. (2023). Decision aids to assist patients and professionals in choosing the right treatment for kidney failure. *Clinical kidney journal*, 16(Supplement\_1), i20-i38.
- Dayani, K., Zia, M., Qureshi, O., Baig, M., & Sabri, T. (2024). Evaluating Pakistan's mental healthcare system using World Health Organization's assessment instrument for mental health system (WHO-AIMS). *International Journal of Mental Health Systems*, 18(1), 32.
- Emeriaud, G., López-Fernández, Y. M., Iyer, N. P., Bembea, M. M., Agulnik, A., Barbaro, R. P., Baudin, F., Bhalla, A., De Carvalho, W. B., & Carroll, C. L. (2023). Executive summary of the second international guidelines for the diagnosis and management of pediatric acute respiratory distress syndrome (PALICC-2). *Pediatric critical care medicine*, 24(2), 143-168.
- Horváth, A., & Molnár, P. (2022). A review of patient safety communication in multicultural and multilingual healthcare settings with special attention to the US and Canada. *Developments in Health Sciences*, 4(3), 49-57.
- Hosseini, M. M., Hosseini, T. M., & Qayumi, K. (2023). Integration of artificial intelligence in medical education: opportunities, challenges, and ethical considerations. *performance evaluation*, 4, 5.
- Hua, Y., Liu, F., Yang, K., Li, Z., Na, H., Sheu, Y.-h., Zhou, P., Moran, L. V., Ananiadou, S., & Clifton, D. A. (2025). Large language models in mental health care: a scoping review. *Current Treatment Options in Psychiatry*, 12(1), 1-18.
- Khattak, A. F., Rahman, A. U., Khattak, M., Qazi, M., Gilani, H., Khan, A., & Rehman, A. U. (2023). Toward sustainable healthcare systems: a low and middle-income Country's case for investing in healthcare reforms. *Cureus*, 15(5).
- Khreisat, M. N., Khilani, D., Rusho, M. A., Karkkulainen, E. A., Tabuena, A. C., & Uberas, A. D. (2024). Ethical implications of AI integration in educational decision making: Systematic review. *Educational Administration: Theory and Practice*, 30(5), 8521-8527.

- Lee, D., & Yoon, S. N. (2021). Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges. *International Journal of Environmental Research and Public Health*, 18(1), 271.
- Mahmood, S., Sequeira, R., Siddiqui, M. M. U., Herkenhoff, M. B. A., Ferreira, P. P., Fernandes, A. C., & Sousa, P. (2024). Decentralization of the health system—experiences from Pakistan, Portugal and Brazil. *Health Research Policy and Systems*, 22(1), 61.
- Malik, S., Allen, R. J., Vachharajani, T. J., Kluger, B., Ahmad, I., & Saeed, F. (2022). Dialysis decision making, dialysis experiences, and illness perceptions: a qualitative study of Pakistani patients receiving maintenance hemodialysis. *Kidney Medicine*, 4(11), 100550.
- Mayes, C. G., & Adams, J. (2025). Transferability of the Surgical Attire Guideline Adherence Decision-Making Theory Beyond New England. *AORN journal*, 121(1), 79-92.
- Minhas, A. (2024). The Need for Local Language Training in Healthcare in Pakistan. *International Annals of Health Sciences*, 1(4).
- Rashid, M., & Sharma, M. (2025). AI-Assisted Diagnosis and Treatment Planning—A Discussion of How AI Can Assist Healthcare Professionals in Making More Accurate Diagnoses and Treatment Plans for Diseases. *AI in Disease Detection: Advancements and Applications*, 313-336.
- Rizzolo, K., Al-Rousan, T., & Cervantes, L. (2022). Dialysis decision making and the patient experience: lessons from Pakistan. *Kidney Medicine*, 4(11).
- Willmen, T., Völkel, L., Ronicke, S., Hirsch, M. C., Kaufeld, J., Rychlik, R. P., & Wagner, A. D. (2021). Health economic benefits through the use of diagnostic support systems and expert knowledge. *BMC Health Services Research*, 21(1), 947.
- Younas, S., Khanum, S., & Qamar, A. H. (2023). Decision making among residents in training of obstetrics and gynecology: A qualitative exploration in Pakistani context. *Plos one*, 18(11), e0287592.