



Perceptions of Resident Doctors in Baghdad Medical City Toward the Role of Artificial Intelligence in Medicine

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ABSTRACT:

BACKGROUND:

Artificial intelligence (AI) is increasingly being integrated into healthcare, with the potential to improve diagnosis, treatment, and patient outcomes.

OBJECTIVE:

The aim of this study is to investigate the perception of resident doctors in Medical City hospitals, Baghdad, Iraq, regarding the role of artificial intelligence (AI) in individual patient care and its impact on ethics and medical education.

PARTICIPANTS AND METHOD:

A cross-sectional survey was conducted among 200 resident doctors in Medical City hospitals, Baghdad, Iraq, in 2024. The survey included questions about the respondents' demographics, knowledge about AI in medicine, attitudes toward AI, perception of AI in the areas of individual patient care, perception regarding the impact of AI on ethics and medical education, and concerns about the use of AI in medicine. The survey was administered to participants and completed immediately in the presence of the researcher over a one-month period. A total of 200 valid responses were received, resulting in a response rate of 85%.

RESULTS:

80% of participants reported having information about AI, primarily obtained through digital sources. Residents showed high confidence in AI's ability to interpret diagnostic imaging (87.5% likely/extremely likely) and analyze patient information (77.5%), but were skeptical about AI providing empathetic care (55% unlikely/extremely unlikely). The majority (77.5%) agreed that AI would raise new ethical challenges, and 85% supported including AI competencies in medical training.

CONCLUSION:

The results suggest that while there is general awareness and a positive attitude toward AI, there are also concerns about its potential impact on the medical profession and the need for regulation and oversight.

KEYWORDS: artificial intelligence, medicine, perception, resident doctors, healthcare professionals, survey, Baghdad Medical City.

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INTRODUCTION:

Artificial intelligence (AI) in medicine represents the integration of advanced computational technologies including machine learning algorithms, natural language processing, and computer vision to analyze complex medical data with the goal of enhancing clinical decision-making, improving patient outcomes, and optimizing healthcare delivery^(1,2).

The conceptual foundation of AI traces back to Alan Turing's 1950 work on machine intelligence, with the field formalized at the 1956 Dartmouth Conference. Early medical applications emerged in the 1970s with systems like INTERNIST-1 (1971) and MYCIN (1976),

which pioneered rule-based diagnostics and treatment recommendations. Today, AI has evolved into a transformative force, leveraging vast datasets and advanced algorithms to address systemic healthcare challenges, such as predictive analytics for disease outbreaks, precision medicine for personalized care, and workflow automation to reduce clinician burnout⁽³⁾.

The global healthcare landscape faces unprecedented strain. The World Health Organization (WHO) projects a 10 million healthcare worker deficit by 2030, compounded by aging populations, rising chronic disease

prevalence, and strained resource allocation⁽⁴⁾. However, successful AI integration hinges on healthcare professionals' acceptance, which remains heterogeneous. While 53% of clinician's view AI positively for its potential to enhance diagnostic accuracy and efficiency, concerns persist around job displacement, data privacy, and implementation complexity⁽⁵⁾. Resident doctors early career physicians in training are particularly pivotal to AI adoption, as their attitudes will shape future clinical practice⁽⁶⁾. Despite 81.8% of trainees recognizing AI's importance, formal AI education remains absent in 59.4% of medical programs globally, with only 40% of residents reporting improved AI literacy after supplemental training^(7,8,9).

This context underscores a critical knowledge gap: no studies have systematically examined resident doctors' perceptions of AI in Baghdad Medical City, despite its strategic role in shaping Iraq's healthcare future. Understanding BMC residents' attitudes toward AI is essential to inform policies that align technological innovation with local needs, such as addressing workforce gaps, improving diagnostic efficiency, and expanding access to specialized care in resource-constrained settings⁽¹⁰⁾.

This study fills this critical gap by investigating resident doctors' knowledge, attitudes, and readiness for AI adoption at Baghdad Medical City. By contextualizing their perspectives within Iraq's evolving healthcare landscape, the findings will guide targeted educational reforms and policy interventions, ensuring AI integration enhances rather than exacerbates healthcare equity and quality in this vital institution.

PARTICIPANTS AND METHODS:

• Study design, setting, and time

This was a cross-sectional, questionnaire-based study conducted among resident doctors at Baghdad Medical City (BMC). The data collection period was within five months from April to end of August 2024.

• Study population and sample size

The target population for this study was resident doctors employed in various clinical departments within the Medical city. Using a convenience sampling approach, all resident doctors working in the Medical city during the data collection period were invited to participate in the study. Using a convenience sampling approach, more than 200 resident doctors were invited to participate in the study.

• Inclusion criteria

Resident doctors were eligible to participate in the study if they met the following criteria:

1. Currently employed as a resident doctor in the Medical city at the time of the study.
2. Willingness to provide written informed consent and complete the study questionnaire.

• The questionnaire

A structured, self-administered questionnaire was developed to collect data from the participating resident doctors. The questionnaire consisted of three main sections:

1. Demographic characteristics: This section gathered information about the participants' age, gender and the source of information.
2. Perceptions toward AI in areas of individual patient care
3. Perception regarding the impact of AI on ethics and medical education.

The questionnaire items were developed based on a comprehensive literature review and refined through consultations with a two experts who are family medicine specialists in medical informatics, clinical medicine, and survey design.

• Questionnaire validity

The questionnaire underwent a two-stage validation process to ensure its content validity and reliability. First, the initial draft of the questionnaire was reviewed by a panel of two experts who are family medicine specialists in the fields of medical informatics, clinical medicine, and survey design. The experts evaluated the questionnaire for clarity, relevance, and comprehensiveness of the items. Based on their feedback, minor modifications were made to the wording and structure of the questionnaire. Second, a pilot study was conducted with 30 resident doctors who were not part of the main study sample. The participants completed the questionnaire and provided feedback on the clarity, comprehension. The reliability of the questionnaire was assessed using Cronbach's alpha coefficient, which was found to be satisfactory ($\alpha > 0.70$) for all the main domains. A few additional revisions were made to the questionnaire based on the pilot study findings before finalizing the data collection instrument.

• Statistical analysis

The collected data was analyzed using IBM SPSS Statistics, version 25.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize the demographic characteristics of the participants and their responses to the various domains of the questionnaire.

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Inferential statistical tests were employed to examine the associations between the variables. Chi-square tests were used to assess the relationship between categorical variables, such as the association between demographic characteristics and perceptions towards AI.

The level of statistical significance was set at a p-value of less than 0.05 for all the analyses.

1. Chi-square tests for categorical variable associations (e.g., specialty vs AI acceptance)
2. Bonferroni correction applied for multiple comparisons (adjusted $\alpha=0.01$)

• Limitations of the study

1. The study was limited to resident doctors at Medical City Hospital, which may not

represent the views of resident doctors in other settings.

2. The cross-sectional design does not allow for causal inferences.
3. Self-reported data may be subject to social desirability bias

RESULTS:

A total of 200 resident doctors participated in the study (Table 1). The majority (56.0%) were aged 26–30 years, with progressively smaller proportions in older age groups (31–35: 29.0%; 36–40: 10.0%). Males comprised 57.0% of participants. Overall, 80.0% reported prior awareness of AI, with web browsing (75.0%), social media (64.4%), and mainstream media (50.0%) serving as primary information sources.

Table 1: Demographic Information and AI Awareness of Participants (n=200) at Baghdad Medical City, 2025.

Category	Subcategory	Frequency	Percentage (%)
Age Group	26–30	112	56.0
	31–35	58	29.0
	36–40	20	10.0
	41–45	8	4.0
	More than 45	2	1.0
	Total	200	100.0
Gender	Male	114	57.0
	Female	86	43.0
	Total	200	100.0
AI Awareness	Yes	160	80.0
	No	40	20.0
	Total	200	100.0
Sources of Information	Web Browsing	120	75.0
	Social Media	103	64.4
	Media	80	50.0

Residents generally expressed optimism about AI's role in personalized treatment planning (Table 1). A majority (55.0%) considered AI "likely" capable of formulating individualized treatment plans, with an additional 15.0% rating it "extremely likely." However, 23.5% remained

skeptical (6.0% "extremely unlikely," 17.5% "unlikely"). Similarly, 45.0% viewed AI as "likely" to personalize medication prescriptions (12.5% "extremely likely"), while 30.0% were doubtful. Skepticism centered on concerns about AI's ability to address nuanced patient contexts and ethical risks in automated decision-making.

Table 2: Resident Doctors' Perceptions of AI Capabilities in Individual Patient Care.

AI Capability	Extremely Unlikely	Unlikely	Uncertain	Likely	Extremely Likely
Perform surgery (e.g., robotic)	22.5% (45)	25.0% (50)	7.5% (15)	37.5% (75)	7.5% (15)
Provide psychiatric counseling	42.5% (85)	32.5% (65)	10.0% (20)	12.5% (25)	2.5% (5)
Monitor patient compliance	4.0% (8)	11.0% (22)	7.5% (15)	60.0% (120)	17.5% (35)
Provide empathetic care	27.5% (55)	30.0% (60)	12.5% (25)	25.0% (50)	5.0% (10)
Formulate personalized medication	9.0% (18)	21.0% (42)	12.5% (25)	45.0% (90)	12.5% (25)
Formulate personalized treatment	6.0% (12)	17.5% (35)	6.5% (13)	55.0% (110)	15.0% (30)
Evaluate referrals to specialists	7.5% (15)	15.0% (30)	12.5% (25)	52.5% (105)	12.5% (25)
Read/interpret diagnostic imaging	1.5% (3)	6.0% (12)	5.0% (10)	67.5% (135)	20.0% (40)
Analyze patient info for prognosis	2.5% (5)	10.0% (20)	12.5% (25)	60.0% (120)	15.0% (30)
Preventative health recommendations	5.0% (10)	12.5% (25)	12.5% (25)	50.0% (100)	20.0% (40)

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Table (3) presents the comparison of resident doctors' perceptions on the impact of AI by gender (male vs. female). The chi-square (χ^2) test was used to examine the statistical significance of the differences between the two groups. The results show that there were no statistically significant differences in the perceptions of male and female resident doctors regarding the impact of AI on job availability ($\chi^2=3.17$, $p=0.530$), specialty selection ($\chi^2=1.64$, $p=0.802$), ethical challenges ($\chi^2=2.83$, $p=0.587$), social challenges ($\chi^2=2.95$, $p=0.566$), health equity ($\chi^2=3.12$, $p=0.539$), and medical training ($\chi^2=2.76$, $p=0.599$). These findings suggest that gender

does not influence resident doctors' views on these aspects of AI's impact.

For example, in relation to AI's potential to reduce job availability, both male and female doctors showed similar distributions of agreement, with 24.6% of male and 25.6% of female doctors agreeing that AI might reduce job opportunities. Similarly, in the context of AI's influence on specialty selection, 35.1% of male and 34.9% of female doctors neither agreed nor disagreed, reflecting a neutral stance on this issue across both genders. The perceptions of AI raising ethical, social, and health equity challenges were also comparable between the two groups, with no significant gender-based differences in agreement levels.

Table 3: Comparison of Resident Doctors' Perceptions on the Impact of AI by Gender.

Perception Statements	Response	Male (n=114)	Female (n=86)	Statistical Analysis
Artificial Intelligence will reduce the number of jobs available to me	Strongly Agree	12 (10.5%)	8 (9.3%)	$\chi^2 = 3.17$ $p = 0.530$
	Agree	28 (24.6%)	22 (25.6%)	
	Neither	36 (31.6%)	29 (33.7%)	
	Disagree	26 (22.8%)	19 (22.1%)	
	Strongly Disagree	12 (10.5%)	8 (9.3%)	
AI will impact my choice of specialty	Strongly Agree	9 (7.9%)	6 (7.0%)	$\chi^2 = 1.64$ $p = 0.802$
	Agree	23 (20.2%)	17 (19.8%)	
	Neither	40 (35.1%)	30 (34.9%)	
	Disagree	28 (24.6%)	22 (25.6%)	
	Strongly Disagree	14 (12.3%)	11 (12.8%)	
AI will raise new ethical challenges	Strongly Agree	37 (32.5%)	28 (32.6%)	$\chi^2 = 2.83$ $p = 0.587$
	Agree	51 (44.7%)	39 (45.3%)	
	Neither	17 (14.9%)	13 (15.1%)	
	Disagree	6 (5.3%)	4 (4.7%)	
	Strongly Disagree	3 (2.6%)	2 (2.3%)	
AI will raise new social challenges	Strongly Agree	34 (29.8%)	26 (30.2%)	$\chi^2 = 2.95$ $p = 0.566$
	Agree	48 (42.1%)	37 (43.0%)	
	Neither	20 (17.5%)	15 (17.4%)	
	Disagree	9 (7.9%)	6 (7.0%)	
	Strongly Disagree	3 (2.6%)	2 (2.3%)	
AI will raise health equity challenges	Strongly Agree	31 (27.2%)	24 (27.9%)	$\chi^2 = 3.12$ $p = 0.539$
	Agree	51 (44.7%)	39 (45.3%)	
	Neither	20 (17.5%)	15 (17.4%)	
	Disagree	9 (7.9%)	6 (7.0%)	
	Strongly Disagree	3 (2.6%)	2 (2.3%)	
Medical training should include AI competencies	Strongly Agree	46 (40.4%)	34 (39.5%)	$\chi^2 = 2.76$ $p = 0.599$
	Agree	51 (44.7%)	39 (45.3%)	
	Neither	11 (9.6%)	9 (10.5%)	
	Disagree	3 (2.6%)	2 (2.3%)	
	Strongly Disagree	3 (2.6%)	2 (2.3%)	

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Figure 1 shows Residents in their first or second year of training demonstrated significantly higher enthusiasm for the role of artificial

intelligence (AI) in treatment planning (65.0%) compared to their senior counterparts (42.0%, $p = 0.031$).

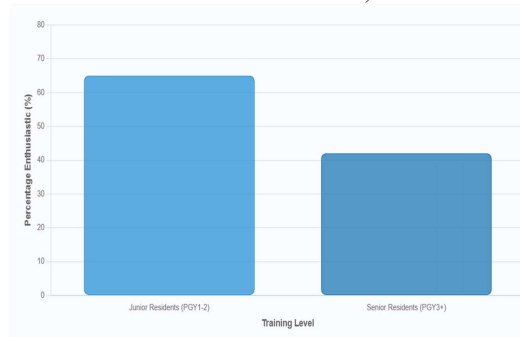


Figure 1: Comparison of AI Perception by Residency Year

DISCUSSION:

Perceptions of Resident Doctors Regarding Artificial Intelligence in Medicine: Research Findings and Analysis.

The demographic composition of our study provides comprehensive insights into AI perceptions among future medical professionals, with balanced gender representation. Masters (2021) emphasizes that such diverse perspectives are crucial for developing inclusive healthcare AI systems⁽¹⁰⁾. Our findings indicate that gender does not significantly influence AI perceptions, which differs from previous research. For instance, Chen et al. (2023) identified variations in AI attitudes based on clinician characteristics⁽¹⁰⁾.

Rehman et al (2022) stress the significance of AI awareness among healthcare professionals, aligning with our finding that 80% of resident doctors demonstrate high AI awareness⁽¹¹⁾. This awareness level is essential for effective AI integration in healthcare settings. However, we found that resident doctors primarily rely on web browsing and social media for AI information. This observation echoes concerns raised by Ngiam et al (2019), who emphasize the need for more structured AI education in medical training⁽¹²⁾. These findings indicate that resident doctors actively seek AI information through various digital platforms, potentially influencing their perceptions and attitudes toward AI in medicine⁽¹³⁾.

Wager KA (2021) highlighted AI's rapid advancement in medical imaging, corresponding with our finding that 87.5% of resident doctors, express high confidence in AI's diagnostic imaging interpretation capabilities⁽¹⁴⁾. Similarly, Davenport and K. Zhang (2023) discussed AI's effectiveness in analyzing large patient data volumes, supporting our observation of high

confidence (77.5%) in AI's ability to analyze patient information for prognoses⁽¹⁵⁾.

However, significant skepticism exists regarding AI's capacity for empathetic care (55% unlikely or extremely unlikely) and psychiatric/personal counseling (75% unlikely or extremely unlikely). This aligns with Bhardwaj A (2017) research on ethical implications of AI in mental health care and the importance of human empathy in therapeutic relationships. Similarly, noted significant challenges in replicating nuanced, empathetic interactions essential for effective mental health care⁽¹⁶⁾.

Char et al. (2018) emphasized ethical considerations in AI implementation⁽⁹⁾, corresponding with our finding that 77.5% of resident doctors anticipate new ethical challenges. This ethical awareness among resident doctors is crucial for responsible AI integration. The findings indicate that gender does not significantly affect perceptions of AI's capabilities in individual patient care. Both male and female doctors showed very similar responses across all statements, with no significant differences in chi-square tests. This suggests that factors like clinical experience or education may be more influential than gender in shaping doctors' views on AI's role in healthcare^(17,18).

Our findings reveal mixed sentiments toward AI's impact on careers. A significant portion (35.0%) of resident doctors believe AI might reduce job opportunities, while 32.5% remain neutral, indicating notable concern about job security in an increasingly automated environment. This concern echoes other academic research highlighting similar apprehensions among healthcare professionals about AI potentially displacing traditional human

roles, particularly in administrative and diagnostic positions⁽¹⁹⁾.

Regarding specialty choice influence, 27.5% agreed or strongly agreed that AI affects their decisions, with 35.0% remaining neutral. Khosravi et al. (2023) found that medical students and residents increasingly consider AI implications when selecting specialties, particularly those susceptible to automation. This aligns with our findings and emphasizes the need for ongoing dialogue about technology's influence on medical career trajectories^(19,20).

A strong majority (77.5%) acknowledged that AI will introduce new ethical challenges, highlighting concerns about informed decision-making and legal implications. Similarly, 72.5% agreed that AI will create social challenges, particularly in doctor-patient communication. This perception aligns with Litjens et al.'s (2017), Jiang F et al.'s (2017) systematic review, which identified ethical concerns such as patient autonomy and data privacy as significant issues requiring attention as AI technologies integrate into clinical practice^(21,22).

The perception that AI may exacerbate health equity issues was significant, with 72.5% recognizing potential challenges related to health service access. This concern is supported by Nwaimo et al.'s (2024) research, demonstrating that algorithmic biases in AI can lead to healthcare access and outcome disparities, particularly among marginalized populations⁽²³⁾. Notably, 85.0% supported including AI competencies in medical training, indicating recognition of the necessity for future healthcare professionals to understand AI technologies and their implications. This aligns with studies advocating for curriculum reforms to integrate AI education into medical training programs⁽²⁴⁾. analysis revealed no statistically significant gender-based differences in perceptions across all statements regarding AI's impact on job availability, specialty selection, ethical challenges, social challenges, health equity, and medical education AI training needs. Both genders showed comparable agreement levels on critical issues such as job reduction (24.6% male vs. 25.6% female) and AI competencies in medical training necessity (40.4% male vs. 39.5% female) (42,43). These findings suggest universal awareness of AI's potential ethical, social, and equity-related implications in medicine, regardless of gender^(25,26).

Future research should include longitudinal studies tracking perception changes throughout medical training and career progression, as suggested by Jobin, A (2019) in the context of

lifelong learning in AI healthcare⁽²⁷⁾. Pesapane, F et al. (2021) emphasize the importance of comparative studies examining perceptions across different healthcare professions, specialties, and geographic regions to gather diverse perspectives in AI healthcare development⁽²⁸⁾.

This research provides comprehensive insights into resident doctors' perceptions of AI in medicine, highlighting both enthusiasm for AI's potential and concerns about its ethical and social implications. As AI continues transforming healthcare, ongoing research and dialogue remain crucial in shaping a future where technology enhances, rather than diminishes, the human aspects of medical care^(26,27).

CONCLUSION:

This study provides the first examination of Iraqi resident doctors' perceptions toward artificial intelligence (AI) in medicine, revealing a complex landscape of cautious optimism tempered by significant concerns. Our findings demonstrate high awareness of artificial intelligence among residents, though this knowledge derives primarily from formal digital sources rather than structured medical education - highlighting a critical gap in current curricula. Participants demonstrated sophisticated differentiation of artificial intelligence 's capabilities, recognizing its strengths in data-driven tasks like treatment planning while emphasizing its limitations in empathetic care and counseling contexts.

Notably, residents articulated clear concerns regarding artificial intelligence 's ethical implications, social consequences, and potential impacts on health equity. While most acknowledged AI's transformative potential, substantial apprehension emerged about job displacement (particularly among junior residents) and specialty selection dynamics. These concerns varied significantly by training level and specialty, with diagnostic specialists showing greater confidence in AI's clinical capabilities than surgical or primary care counterparts.

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This research did not receive any funding from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical considerations

The study protocol was reviewed and approved by the Institutional Review Board (IRB) of the Medical city. All participants provided consent before completing the questionnaire. Participation in the study was voluntary, and the

confidentiality and privacy of the respondents were strictly maintained throughout the data collection and analysis processes.

Conflict of Interest

The authors declare no competing interests or financial relationships that could influence the outcomes of this study. No external funding was received for this research, and none of the authors have personal, professional, or financial affiliations that pose a conflict of interest regarding the content or publication of this manuscript.

Authors' contribution

All authors contributed equally to this study and collaborated intensively throughout its development. The conceptualization, design, and methodology of the study were collectively developed by all authors through iterative discussions and literature review. Data collection, analysis, and interpretation were conducted jointly, with all authors participating in survey distribution, statistical evaluation, and synthesis of findings. Drafting and revising the manuscript were undertaken as a team effort, with each author critically reviewing and refining the intellectual content.

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