ORIGINAL ARTICLE

The use of artificial intelligence in diagnosing emergency cases: a cross-sectional study of physicians' perspectives on the effectiveness of AI systems in improving diagnostic accuracy and reducing time to diagnosis

Sara S Al-Zahrani[1], Abdulrahman Mohammed Alkhuzaee[1*], Mamdouh Saeedan Alqurashi[1], Jana Osama Ghazi[1], Majed Ahmad Dowayd[1], Sulafah Reda Namangani[1], Rahaf Khalid Bashamakh[2], Nawaf Hussain Aljafari[1], Mohammed Abu Aish[3]

ABSTRACT

Background: Artificial intelligence (AI) has the potential to improve diagnosis accuracy and speed in emergency rooms; yet, its acceptance and use by emergency physicians in Saudi Arabia remain limited.

Methods: A descriptive cross-sectional survey was issued to emergency physicians in Saudi Arabia. The questionnaire looked at demographics, AI exposure, perceived benefits and problems, and overall views toward AI. The data were evaluated with descriptive statistics, chi-square tests, ANOVA, and logistic regression.

Results: A total of 352 physicians participated, the majority of whom were young residents. Only 11.6% said they used AI on a regular basis. The majority of physicians (65.3%) had a negative attitude, whereas 6.8% were optimistic. Consultants had more favorable perceptions than residents. Attitudes differed considerably by region, age, gender, country, and professional level ($p < 0.05$). Key perceived benefits included increased diagnostic accuracy and speedier decision-making, while major hurdles included a lack of training, system inaccuracy, and difficulties interpreting AI outputs. Male and non-Saudi physicians had higher positive sentiments.

Conclusion: Despite acknowledging AI›s potential, practical adoption in emergency contexts remains low due to poor training and dependability issues. Structured AI training and system development are required to ensure a safe and effective integration into emergency practice.

Keywords: Artificial intelligence, emergency department, diagnostic accuracy, decision-making, triage, clinical practice, healthcare technology, AI in medicine.

Introduction

Artificial intelligence (AI) is the development of computer systems that can execute human cognitive capabilities, including problem solving and decision making. AI-based algorithms are rapidly being used to anticipate a variety of medical factors, including diagnosis, therapy selection, and risk assessment. AI has showed great potential in improving the capacities of emergency departments (EDs), which treat patients with

Correspondence to: Abdulrahman Mohammed Alkhuzaee
*Department of Medicine, College of Medicine, Umm Al- Qura University, Makkah, Saudi Arabia
Email: dhmi678@gmail.com
Full list of author information is available at the end of the article.
Received: 08 December 2025 | **Accepted**: 19 January 2026

a wide range of diseases from non-urgent to serious. To achieve prompt and correct medical interventions in these circumstances, proper prioritizing and patient evaluation must take place using dynamic systems [1,2].

AI's significance in emergency departments has grown dramatically, as it is utilized to increase diagnostic accuracy, aid in clinical decision-making, and maximize operational efficiency. AI aids diagnostic processes by evaluating medical imaging, such as X-rays, computed tomography (CT) scans, and magnetic resonance imaging (MRI), to detect conditions including trauma, stroke, and pneumonia [3]. It also uses real-time patient data to aid clinical decision-making by recommending treatments based on patient severity [4]. Furthermore, AI contributes significantly to predictive analytics by forecasting critical illnesses such as sepsis and cardiac arrest based on vital signs and medical history [5]. AI-enhanced triage systems select patients based on urgency, ensuring that the most serious cases receive immediate attention [6]. Furthermore, AI helps to optimize resource management in the ED by anticipating patient volumes and improving staff allocation, potentially reducing overcrowding [7]. Continuous patient monitoring facilitated by AI exposes clinicians to early indicators of deterioration, ultimately improving patient outcomes [3].

Several research have examined the use of AI in emergency case diagnosis, with varying results. A comprehensive review conducted in Germany emphasized the increasing usage of AI applications in emergency care; nevertheless, most studies are still in early phases of development and lack sufficient generalizability, underlining the need for more advanced approaches in future study [6]. Another study, done at a tertiary research hospital's emergency department, demonstrated that AI, namely ChatGPT, was effective in differentiating patients with high urgency [8]. Furthermore, a diagnostic accuracy research at Imam Khomeini Hospital Complex, including 215 patients with acute abdominal discomfort, found that AI could create a model with a high level of diagnostic accuracy for emergency case triage [1].

The goal of this study is to determine the effectiveness of AI in diagnosing situations in the emergency room.

Subjects and Methods

This descriptive cross-sectional study evaluated emergency department (ED) physicians' attitudes, experiences, and perceived usefulness of AI in emergency medical diagnosis across Saudi Arabia. Data were collected between March and September 2025. The target population consisted of licensed emergency physicians aged 24 and above, representing several specialties practicing in emergency settings, as well as a wide range of educational backgrounds, job situations, and geographical locations. The inclusion of ED physicians from various professional categories was intended to provide a complete perspective on AI-related diagnostic techniques.

To improve data validity and assure accurate depiction of real-world ED procedures, part of the data collection method entailed visiting emergency departments (EDs) in person and approaching and inviting on-site physicians to participate. This strategy enabled the research team to directly contact active ED physicians during clinical shifts, enhancing response quality and reducing selection bias. Additional responses were gathered online to increase sample size and geographic diversity.

Only physicians who provided complete responses and informed consent were considered in the final analysis. Participants who were under the age of 24, unlicensed, or had no prior experience with diagnostic or AI-assisted tools were eliminated. According to the most recent Ministry of Health statistics for physicians and dentists in Saudi Arabia (2023), a minimum sample size of 344 physicians, stratified by gender, nationality, specialty, and professional category, was calculated using OpenEpi with a 95% confidence interval and a 5% margin of error. However, data collection was extended beyond this criterion to improve statistical robustness, and a total of 352 responses were examined.

Data were obtained using a validated, self-administered online questionnaire created with Google Forms. To optimize accessibility and reach, the questionnaire was circulated electronically via social media platforms such as WhatsApp, X (previously Twitter), Telegram, and email groups, as well as in-person within educational institutions. The instrument underwent professional evaluation and pilot testing to assure its clarity, relevance, and logical flow.

The questionnaire has various sections that were aimed to capture demographic and AI-related information. Demographic data included age, gender, nationality, specialty, job status, years of experience, and practice region. Additional questions assessed physicians' current usage of diagnostic tools, prior exposure to AI platforms, and their overall health and workload characteristics. The AI component investigated physicians' impressions of AI's diagnostic accuracy, dependability, impact on diagnosis time, utility in clinical decision-making, comfort level with AI tools, and perceived barriers and benefits of incorporating AI into emergency departments.

Data was initially exported to Microsoft Excel for cleaning and coding. Statistical analyses were carried out with IBM Statistical Package for the Social Sciences (SPSS) version 28. The demographic variables and AI-related replies were summarized using descriptive statistics such as frequencies, percentages, averages, and standard deviations. Pearson's chi-square test or Fisher's exact test were used to investigate associations between independent variables and physicians' attitudes toward AI-assisted diagnosis, if appropriate. A p-value of <0.05 was judged statistically significant.

Ethical approval and consent to participate

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Biomedical Research Ethics Committee at Umm Al-Qura University, Saudi Arabia (Approval No. HAPO-02-K-012-2025-03-2589). Informed consent was obtained electronically from all participants prior to their participation. Participation was voluntary, and confidentiality and anonymity of the collected data were strictly maintained.

Data analysis

Data analysis was conducted using IBM SPSS Statistics version 28 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the participants' sociodemographic and professional characteristics, as in emergency diagnosis well as their responses to items assessing perspectives on AI. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using means and standard deviations (mean ± SD).

To assess physicians' perspectives on AI use in emergency settings, a scoring system was developed based on responses to five Likert-scale items, with each item scored from 1 to 5. The total perspective score ranged from 8 to 40. Based on the total score, attitudes were categorized into three groups:

Negative attitude: total score ≤ 23

Neutral or moderate attitude: score 24–31

Positive attitude: score ≥ 32

Comparisons of mean perspective scores across professional levels (resident, specialist, consultant) were performed using one-way analysis of variance (ANOVA). Associations between physicians' attitudes and various sociodemographic and professional factors were evaluated using Pearson's chi-square test (χ^2) or Fisher's exact test when appropriate. Relationships between attitudes and perceived benefits or challenges of AI use were also examined using chi-square tests. Furthermore, a multivariate logistic regression analysis was performed to identify independent predictors of having a positive attitude toward AI. Results were expressed as adjusted odds ratios (AORs) with corresponding 95% confidence intervals (CIs). A p-value of < 0.05 was considered statistically significant throughout the analysis. All figures and visualizations were generated using Microsoft Excel 2019.

Results

The study included 352 physicians, with roughly equal representation of male (N = 180, 51.1%) and female (N = 172, 48.9%) participants. The bulk of participants were young physicians, with more than 60% (N = 212, 60.2%) falling between the ages of 20 and 30. Emergency medicine residents made up the biggest group (N = 234, 66.5%), followed by specialists (N = 82, 23.3%) and consultants (N = 36, 10.2%). Geographically, the Western Region received the most replies (N = 116, 33.0%), followed by the Central Region (N = 83, 23.6%) and the Eastern Region (N = 77, 21.9%). Finally, the vast majority of the physicians were Saudi (N = 317, 90.1%) (Table 1).

Table 2 summarizes clinicians' thoughts on the role of AI in ED diagnosis. Physicians were most optimistic about AI's ability to increase diagnostic accuracy and minimize diagnosis time (mean = 2.3 ± 1.2). However, in both cases, less than 35% of respondents strongly agreed (accuracy: N = 123, 34.9%; time reduction: N = 116, 33.0%).

Table 1. *Socio-demographic characteristics and professional data of study participants (N = 352).*

Data	No	%
Region		
Central region	83	23.6%
Northern region	24	6.8%
Eastern region	77	21.9%
Western region	116	33.0%
Southern region	52	14.8%
Age in years		
20-30	212	60.2%
30-40	66	18.8%
40-50	46	13.1%
50-60	21	6.0%
> 60	7	2.0%
Gender		
Male	180	51.1%
Female	172	48.9%
Nationality		
Saudi	317	90.1%
Non-Saudi	35	9.9%
Profession		
Emergency Medicine Resident	234	66.5%
Emergency Medicine Specialist	82	23.3%
Emergency Medicine Consultant	36	10.2%

In terms of reliability and comfort (negative effects), the highest mean scores were observed for relying on AI in emergency decision-making (mean = 2.8 ± 1.3) and considering AI a reliable substitute to human physicians (mean = 2.8 ± 1.4). In the latter case, a significant proportion of respondents (N = 91, 25.9%) chose a neutral response, indicating uncertainty rather than outright rejection. Difficulty working with AI systems had a high mean score (2.8 ± 1.3), indicating ongoing hurdles to process integration.

Only 11.6% (N = 41) of physicians reported regular use of AI approaches in their job, resulting in a neutral mean score (mean = 2.7 ± 1.3). Furthermore, the majority of respondents were ambivalent when comparing AI accuracy to their own clinical judgment (N = 117, 33.2%), indicating that AI is currently viewed as an unconfirmed or non-integrated technology rather than a trusted clinical aid in emergency circumstances.

Figure 1 depicts clinicians' thoughts on the benefits and challenges of employing AI in ED diagnosis. The three most often stated benefits were improved diagnostic accuracy (N = 186, 52.8%), supporting clinicians with rapid decision-making (N = 184, 52.3%), and shorter patient wait times (N = 184, 52.3%). These findings suggest that AI is largely viewed as a tool for improving the essential operations of emergency care, including speed and precision. In contrast, the most generally stated problems were a lack of training in AI technologies (N = 191, 54.3%), system inaccuracy in some circumstances (N = 148, 42.0%), and difficulty interpreting AI-generated findings (N = 113, 32.1%), all of which have a negative

Table 2. *Physicians' perspectives on the effectiveness, utility, and reliability of AI in emergency diagnosis (N = 352).*

Perspectives on the Effectiveness	1 (No, %)	2 (No, %)	3 (No, %)	4 (No, %)	5 (No, %)	Mean ± SD
Can AI improve diagnostic accuracy in emergency cases?	123 (34.9%)	88 (25.0%)	77 (21.9%)	40 (11.4%)	24 (6.8%)	2.3 ± 1.2
Does AI reduce the time to diagnose emergencies compared to traditional methods?	116 (33.0%)	97 (27.6%)	78 (22.2%)	32 (9.1%)	29 (8.2%)	2.3 ± 1.2
Can AI be a reliable alternative to human doctors in emergency diagnosis?	90 (25.6%)	60 (17.0%)	91 (25.9%)	63 (17.9%)	48 (13.6%)	2.8 ± 1.4
Do you regularly use AI techniques in emergency department work?	86 (24.4%)	72 (20.5%)	99 (28.1%)	54 (15.3%)	41 (11.6%)	2.7 ± 1.3
How do you evaluate AI diagnostic accuracy versus your own?	82 (23.3%)	80 (22.7%)	117 (33.2%)	44 (12.5%)	29 (8.2%)	2.6 ± 1.2
Do you find it difficult to interact with AI systems during diagnosis?	68 (19.3%)	84 (23.9%)	88 (25.0%)	59 (16.8%)	53 (15.1%)	2.8 ± 1.3
Is AI particularly useful in rapid diagnosis (e.g., stroke, heart attack)?	81 (23.0%)	87 (24.7%)	95 (27.0%)	53 (15.1%)	36 (10.2%)	2.6 ± 1.3
Do you feel comfortable relying on AI in emergency decisions?	79 (22.4%)	66 (18.8%)	107 (30.4%)	60 (17.0%)	40 (11.4%)	2.8 ± 1.3

impact on trust and adoption. Resistance from physicians or medical teams was also recorded ($N = 94$, 26.7%).

Figure 2 demonstrates that the vast majority of physicians (65.3%) had a negative view about the use of AI in emergency diagnosis. Only 6.8% had a positive attitude, while 27.8% had neutral or moderately supportive views.

Figure 3 illustrates the differences in mean perspective scores between male and female physicians.

Table 3 shows the mean scores of physicians' thoughts on AI use in emergency diagnosis, broken down by professional level. Across most items, emergency medicine consultants consistently reported higher mean scores, reflecting more positive sentiments toward AI than specialists and residents. Statistically significant differences were seen across multiple areas. Consultants were more likely to agree that AI can minimize diagnostic time (mean = 2.6 ± 1.3) than residents (2.2 ± 1.2; p = 0.049). Consultants assessed AI diagnostic accuracy much higher (3.2 ± 1.4) compared to residents (2.5 ± 1.2) and specialists (2.6 ± 1.1; p = 0.006). Consultants agreed more on the utility of AI in rapid diagnosis (3.2 ± 1.3; p =0.003) and were more confident in using AI for emergency judgments (3.2 ± 1.5; p = 0.0001). They also reported considerably greater ease in engaging with AI systems (3.2 ± 1.3) than locals (2.7 ± 1.3; p =.017).

Table 4 outlines factors influencing physicians' attitudes about AI use in emergency diagnosis. Attitude was substantially linked with region (p = 0.001), with physicians from the Eastern (79.2%) and Western Regions (70.7%) having the most negative attitudes, while physicians from the Southern Region had the most positive views (17.3%). Age was also substantially associated with viewpoint (p = 0.0001), with physicians aged 20-30 years more likely to have unfavorable attitudes (68.4%) than those older than 60 years, who had the largest proportion of positive views (57.1%). Gender was strongly linked with viewpoint (p = 0.010), with females having higher negative views (73.3%) than males (57.8%). Nationality also indicated a significant correlation (p = 0.004), with Saudi physicians more likely to have negative attitudes (67.8%) than non-Saudi physicians (42.9%), who had higher positive attitudes (17.1%). Professional level was also strongly associated with viewpoint (p = 0.022), with residents having the most unfavorable opinions (70.1%), while consultants had more positive attitudes (16.7%).

Table 5 depicts the relationship between physicians' overall attitudes on AI use in emergency diagnosis and their perceived benefits and obstacles. These relationships were statistically significant for both benefits (p = 0.001) and problems (p = 0.008). Among perceived benefits, "improving diagnostic accuracy" was the most popular; nonetheless, 74.2% of physicians who chose this benefit still had a negative view towards AI. Similarly, individuals with unfavorable or neutral sentiments were more likely to select "assisting physicians in rapid decision-making" and "reducing patient waiting time". Regarding problems, "lack of training in AI technologies" was the most commonly cited issue, with 70.2% of replies coming from physicians with negative sentiments. Other obstacles, such as difficulty interpreting AI results,

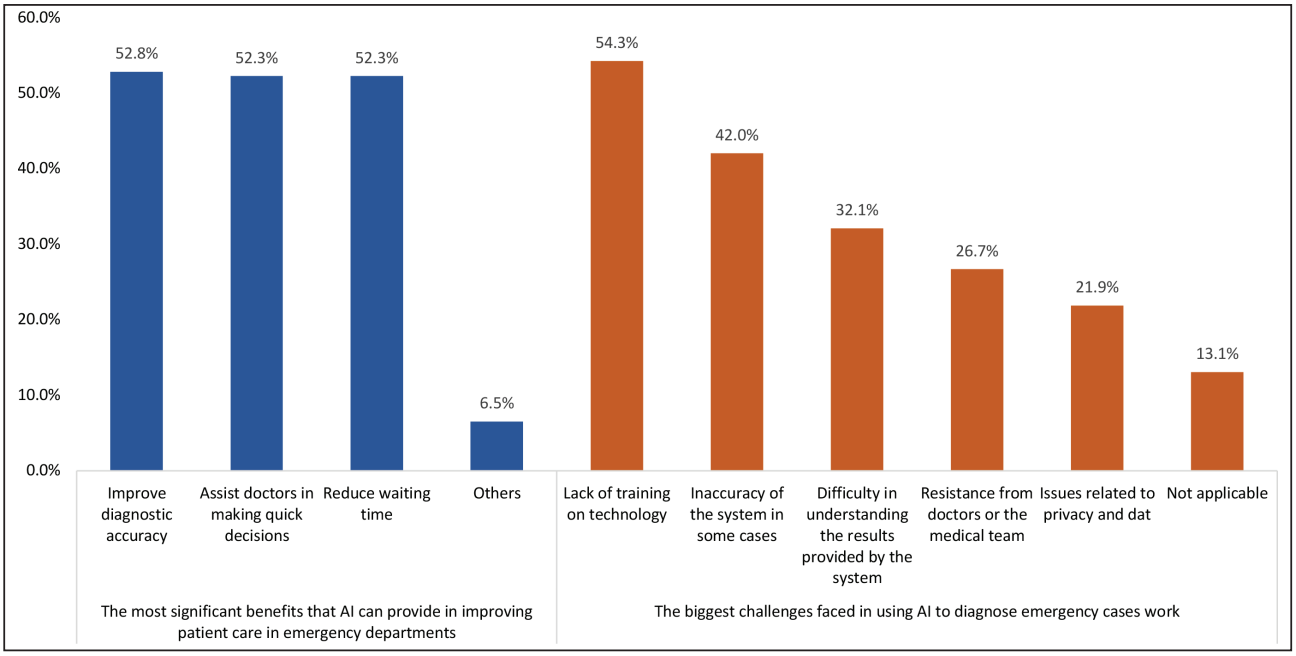

Figure 1. *Perceived benefits and significant challenges of using AI in emergency departments (N = 352).*

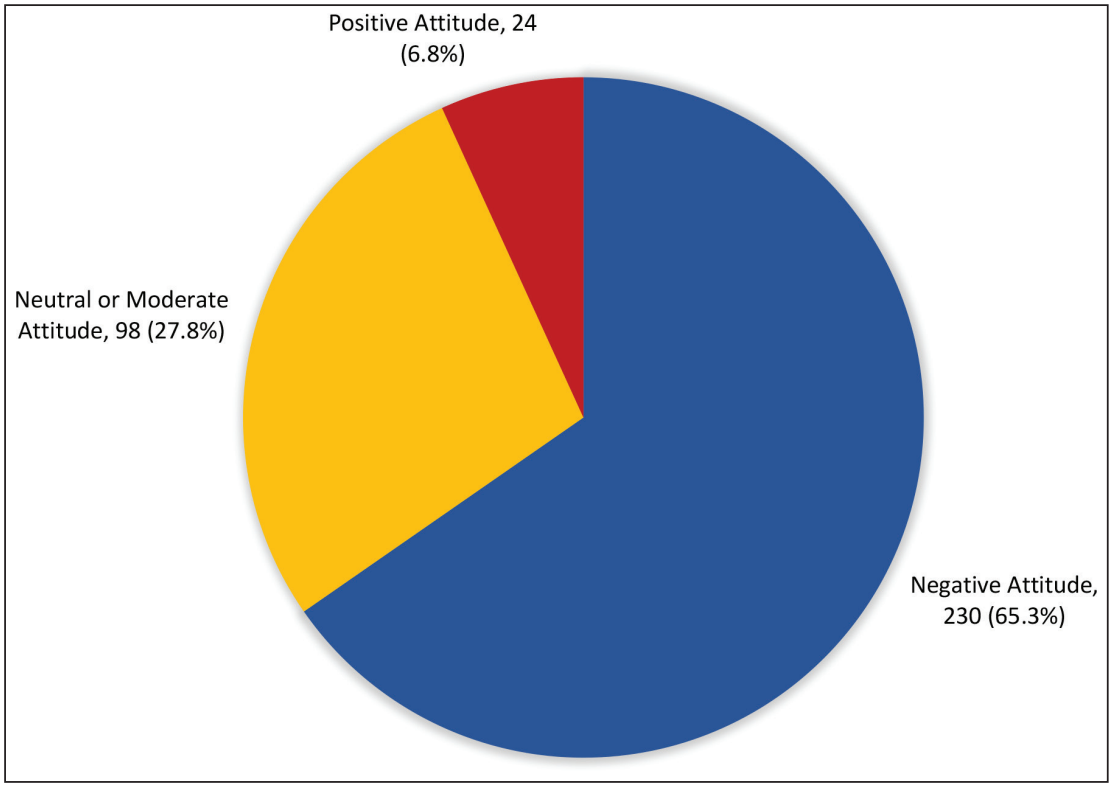

Figure 2. *Overall physician perspectives on the use of AI in emergency diagnosis.*

system inaccuracies, opposition from coworkers, and privacy or data security issues, followed a similar trend.

Table 6 shows the findings of a multivariate logistic regression analysis, which identified characteristics linked with physicians' positive attitudes on AI use in emergency diagnosis. Physicians from the Eastern Region had a substantially lower likelihood of reporting a favorable attitude than those from the Central Region (AOR = 0.40, 95% CI: 0.19-0.84; p = 0.016). Gender was also a significant predictor, with male physicians reporting a more positive attitude than females (AOR = 1.79, 95% CI: 1.11-2.87; p = 0.017). Furthermore, non-Saudi physicians were more than twice as likely to have positive sentiments than Saudi physicians (AOR = 2.63, 95% CI: 1.22-5.67; p = 0.014). Other variables, such as age, professional level, and remaining geographical categories, were not statistically significant ($p > 0.05$).

Table 3. *Mean scores (±SD) of physicians' perspective on AI use in emergency diagnosis, stratified by professional level.*

Perspective items	Emergency Medicine Resident	Emergency Medicine Specialist	Emergency Medicine Consultant	*p*-value
Can AI improve diagnostic accuracy in emergency cases?	2.2 ± 1.2	2.5 ± 1.3	2.4 ± 1.3	0.140
Does AI reduce time to diagnose emergencies versus traditional methods?	2.2 ± 1.2	2.5 ± 1.4	2.6 ± 1.3	0.049*
Can AI be a reliable alternative to human doctors in emergency diagnosis?	2.8 ± 1.4	2.7 ± 1.2	3.1 ± 1.4	0.397
Do you regularly use AI techniques in emergency department work?	2.6 ± 1.3	2.8 ± 1.3	3.0 ± 1.3	0.115
How do you evaluate AI diagnostic accuracy versus your own?	2.5 ± 1.2	2.6 ± 1.1	3.2 ± 1.4	0.006*
Do you find it difficult to interact with AI systems during diagnosis?	2.7 ± 1.3	3.1 ± 1.2	3.2 ± 1.3	0.017*
Is AI particularly useful in rapid diagnosis (e.g., stroke, heart attack)?	2.5 ± 1.2	2.8 ± 1.2	3.2 ± 1.3	0.003*
Do you feel comfortable relying on AI in emergency decisions?	2.6 ± 1.3	3.0 ± 1.2	3.2 ± 1.5	0.001*

P: One-Way ANOVA
** P < 0.05 (significant).*

Table 4. *Factors associated with physicians' perspective on AI use in ER diagnosis, Saudi Arabia.*

Factors	The overall physicians' perspective on AI use in ER diagnosis						*p*-value
	Negative Attitude		Neutral or Moderate Attitude		Positive Attitude		
	No	%	No	%	No	%	
Region							0.001*
Central Region	49	59.0%	33	39.8%	1	1.2%	
Northern Region	12	50.0%	9	37.5%	3	12.5%	
Eastern Region	61	79.2%	11	14.3%	5	6.5%	
Western Region	82	70.7%	28	24.1%	6	5.2%	
Southern Region	26	50.0%	17	32.7%	9	17.3%	
Age in years							0.0001*^
20-30	145	68.4%	55	25.9%	12	5.7%	
30-40	42	63.6%	20	30.3%	4	6.1%	
40-50	29	63.0%	15	32.6%	2	4.3%	
50-60	13	61.9%	6	28.6%	2	9.5%	
> 60	1	14.3%	2	28.6%	4	57.1%	
Gender							0.010*
Male	104	57.8%	61	33.9%	15	8.3%	
Female	126	73.3%	37	21.5%	9	5.2%	
Nationality							0.004*
Saudi	215	67.8%	84	26.5%	18	5.7%	
Non-Saudi	15	42.9%	14	40.0%	6	17.1%	
Profession							0.022*
Emergency Medicine Resident	164	70.1%	57	24.4%	13	5.6%	
Emergency Medicine Specialist	48	58.5%	29	35.4%	5	6.1%	
Emergency Medicine Consultant	18	50.0%	12	33.3%	6	16.7%	

P: Pearson X2 test; ^: Exact Probability test.
** P < 0.05 (significant).*

Discussion

This cross-sectional study investigated emergency physicians' attitudes toward the use of AI in diagnosing emergency cases throughout Saudi Arabia. The findings revealed a prevalence of negative sentiments (65.3%), with only 6.8% of participants expressing a positive outlook. Despite the low adoption rate, more than half of physicians recognized AI's potential benefits, particularly in enhancing diagnostic accuracy (52.8%) and assisting with speedy decision-making (52.3%). These findings imply that, while physicians recognize AI's potential, its practical application in emergency departments (EDs) is hampered by a number of structural and pedagogical constraints.

The demographics of the respondents had a significant impact on their perceptions. The bulk of participants were young physicians aged 20-30 years (60.2%) and residents (66.5%), both of whom were skeptical of AI. This is due to insufficient exposure to AI tools and a lack of formal training programs. Similar findings were observed by Castelvecchi [9] and Goddard et al. [10], who emphasized that early-career physicians frequently express distrust

Table 5. *Association of physicians' perspectives with the benefits and challenges of AI use in emergency department diagnosis.*

Items	The overall physicians' perspective on AI use in ER diagnosis						p-value
	Negative Attitude		Neutral or Moderate Attitude		Positive Attitude		
	No	%	No	%	No	%	
In your opinion, what are the most significant benefits that AI can provide in improving patient care in emergency departments?							
Improve diagnostic accuracy	138	74.2%	39	21.0%	9	4.8%	.001*
Assist doctors in making quick decisions	111	60.3%	58	31.5%	15	8.2%	
Reduce waiting time	120	65.2%	56	30.4%	8	4.3%	
Others	8	34.8%	9	39.1%	6	26.1%	
What are the biggest challenges you might face in using AI to diagnose emergency cases in your work?							
Lack of training on technology	134	70.2%	46	24.1%	11	5.8%	.008*
Difficulty in understanding the results provided by the system	79	69.9%	30	26.5%	4	3.5%	
Inaccuracy of the system in some cases	83	56.1%	57	38.5%	8	5.4%	
Resistance from doctors or the medical team	59	62.8%	26	27.7%	9	9.6%	
Issues related to privacy and data	46	59.7%	24	31.2%	7	9.1%	
Not applicable	27	58.7%	14	30.4%	5	10.9%	

P: Pearson X^2 test; ^: Exact Probability test
* $P < 0.05$ (significant).

Table 6*. Multivariate logistic regression analysis of predictors of positive physician attitudes toward AI use in emergency diagnosis.*

Predictors	*p*-value	OR_A	95% CI	
			Lower	Upper
Region				
Northern region	0.637	1.26	0.48	3.29
Eastern region	0.016*	0.40	0.19	0.84
Western Region	0.140	0.63	0.34	1.16
Southern Region	0.285	1.49	0.72	3.07
Age in years	0.352	1.13	0.87	1.47
Male versus Female gender	0.017*	1.79	1.11	2.87
Non-Saudi versus Saudi	0.014*	2.63	1.22	5.67
Profession				
Emergency Medicine Specialist versus Resident	0.492	1.22	0.69	2.17
Emergency Medicine Consultant versus Resident	0.327	1.52	0.66	3.53

OR_A: Adjusted odds ratio; CI: Confidence interval
* $P < 0.05$ (significant).

in AI due to the "black-box" nature of algorithms and unclear accountability systems. In contrast, consultants in this study reported much more comfort and confidence in using AI for clinical decision-making ($p = 0.001$). This is consistent with Loh et al. [11] and Alghamdi et al. [12], who discovered that clinical seniority and past experience with digital tools are important determinants of AI trust and adoption.

Regional and gender differences were also identified. Physicians from the Eastern (79.2%) and Western (70.7%) areas had the most negative sentiments, while those from the Southern Region had the most positive attitudes (17.3%). Male physicians were more optimistic than females ($p = 0.017$), whereas non-Saudi physicians had higher positive attitudes than Saudi nationals ($p = 0.014$). These trends could reflect inequalities in institutional exposure and training possibilities, as well as educational backgrounds. Similar trends were observed in studies from Australia and Europe, where exposure to AI-integrated systems was associated with better acceptance rates among clinicians [13,14]. This emphasizes the necessity of national measures for ensuring fair access to AI education and infrastructure across regions and genders.

Participants cited the most significant problems as a lack of AI training (54.3%), system inaccuracy (42.0%), and difficulty interpreting AI outcomes (32.1%), demonstrating that integration barriers remain persistent. These findings are consistent with those of Fritsch et al. [15] and Chen et al. [16], who noted that insufficient AI education, usability problems, and restricted algorithm transparency impair clinician trust. Furthermore,

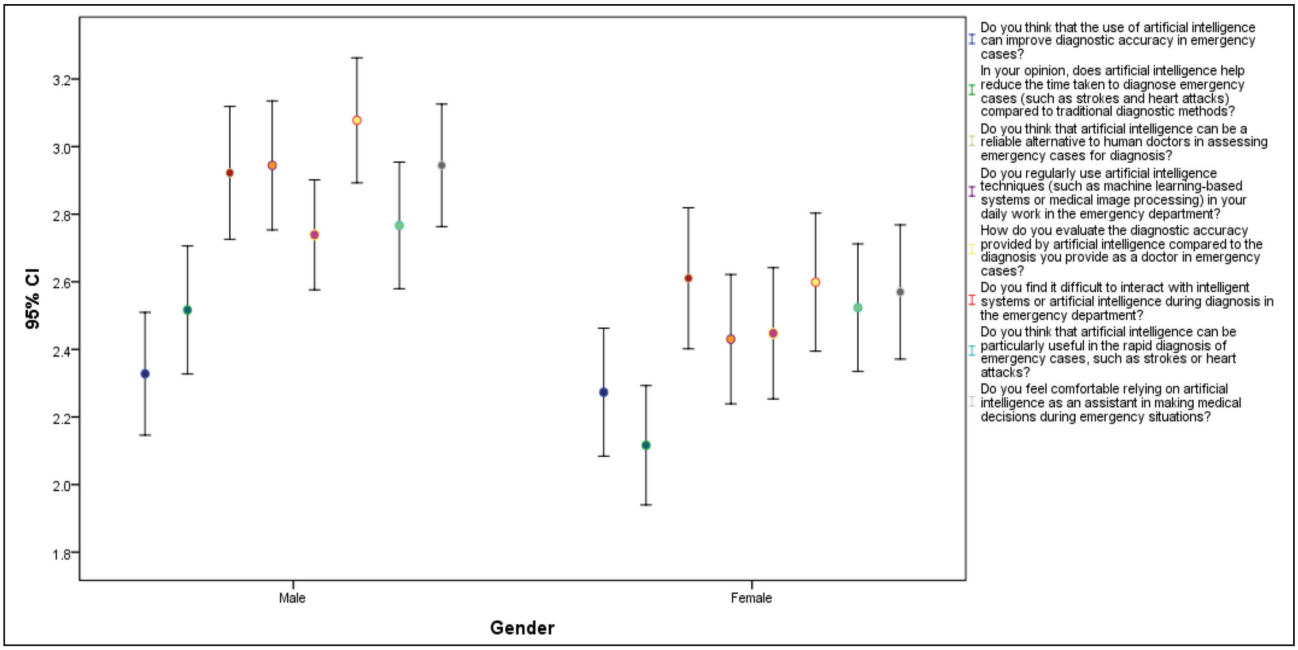

Figure 3. *Error bars for Mean Scores (±CI) of physicians' perspective on AI use in emergency diagnosis, stratified by gender.*

ethical concerns about data privacy, accountability, and automated bias continue to be significant barriers to clinical use [9,10]. While several studies, such as those conducted by Stewart et al. [17] and Eastwood et al. [18], found that emergency physicians regard AI as a beneficial decision-support tool, they repeatedly stressed the importance of retaining human oversight to avoid overreliance on automation.

The findings of this study demonstrated that consultants scored much higher in their belief that AI decreases diagnosis time (p = 0.049) and increases diagnostic accuracy when compared to their own judgments. This suggests that when physicians gain exposure and practical experience, they get a stronger appreciation for AI's diagnostic skills. Loh et al. [11] came to similar conclusions, reporting that prior training and familiarity dramatically increase doctors' trust and acceptance of AI in emergency medicine. As a result, structured educational programs that incorporate workshops, simulation-based training, and AI certification modules into residency curricula may be helpful techniques for increasing competence and confidence among early-career physicians.

Although the current use of AI in EDs is low (11.6%), increasing awareness of its potential benefits indicates an opportunity for healthcare change. To achieve safe and effective integration, AI solutions must be understandable, transparent, and designed to supplement rather than replace clinical judgment. Building trust and accountability requires establishing clear legal frameworks, developing hospital-level AI policies, and providing continual professional training [9,12]. Furthermore, joint research between technology developers and physicians should prioritize improving the interpretability of AI systems and confirming their accuracy in real-world emergency circumstances.

Strengths and limitations

A notable aspect of this study is the inclusion of a large, diversified, and geographically representative sample of emergency physicians from all five Saudi regions, allowing for a full assessment of national perceptions. The inclusion of several professional levels—residents, experts, and consultants—enabled comparisons across experience groups. However, the study's cross-sectional design limits causal inference, and the use of self-reported data may introduce response bias. Furthermore, the study only included emergency medicine professionals, limiting the generalizability of the findings to other medical disciplines. Furthermore, the majority of responders were from the Western Region, which is most likely due to the location of the research team and linked university. This may have contributed to a higher response rate in that location, limiting the results' applicability to other regions.

Conclusion

In summary, this study reveals a cautious but growing interest in the use of AI among Saudi emergency physicians. While the majority recognized AI's promise to increase diagnostic accuracy and decision-making speed, real-world adoption remained low due to insufficient training, a lack of institutional support, and concerns about reliability. Consultants' higher confidence levels than locals imply that professional expertise and exposure play an important role in establishing positive opinions. As a result, national healthcare authorities should prioritize structured AI literacy programs, transparent system development, and policy-level assistance to ensure the safe incorporation of AI into emergency care. Future longitudinal and multi-specialty research is needed to assess changing perceptions and quantify the long-term impact of AI adoption on patient outcomes and clinical efficiency.

List of Abbreviation

AI Artificial intelligence

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

None.

Consent to participate

Written informed consent was obtained from all participants involved in this study.

Consent for publication

Not applicable.

Ethical approval

Ethical approval was granted by the Biomedical Research Ethics Committee at Umm Al-Qura University (Approval No.: HAPO-02-K-012-2025-03-2589).

Author details

Sara S Al-Zahrani[1], Abdulrahman Mohammed Alkhuzaee[1], Mamdouh Saeedan Alqurashi[1], Jana Osama Ghazi[1], Majed Ahmad Dowayd[1], Sulafah Reda Namangani[1], Rahaf Khalid Bashamakh[2], Nawaf Hussain Aljafari[1], Mohammed Abu Aish[3]

1. Department of Medicine, College of Medicine, Umm Al-Qura University, Mecca, Saudi Arabia
2. College of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia
3. Assistant Professor, Department of Pediatrics, Umm Al-Qura University Makkah, Makkah, Saudi Arabia

References

1. Farahmand S, Shabestari O, Pakrah M, Hossein-Nejad H, Arbab M, Bagheri-Hariri S. Artificial intelligence–based triage for patients with acute abdominal pain in emergency department: a diagnostic accuracy study. Adv J Emerg Med. 2017;1(1):e5. https://doi.org/10.22114/AJEM.v1i1.11
2. Seyedhosseini-Davarani S, Nejati A, Hossein-Nejad H, Mousavi SM, Sedaghat M, Arbab M, et al. Outcome-based validity and reliability assessment of raters regarding the admission triage level in the emergency department: a cross-sectional study. Adv J Emerg Med. 2018;2(3):32. https://doi.org/10.22114/AJEM.v0i0.76
3. Mendo IR, Marques G, De La Torre Díez I, López-Coronado M, Martín-Rodríguez F. Machine learning in medical emergencies: a systematic review and analysis. J Med Syst. 2021;45(10):88. https://doi.org/10.1007/s10916-021-01762-3
4. Liu N, Zhang Z, Ho AFW, Ong MEH. Artificial intelligence in emergency medicine. J Emerg Crit Care Med. 2018;2:1–10. https://doi.org/10.21037/jeccm.2018.10.08
5. Kijpaisalratana N, Sanglertsinlapachai D, Techaratsami S, Musikatavorn K, Saoraya J. Machine learning algorithms for early sepsis detection in the emergency department: a retrospective study. Int J Med Inf. 2022;160:104689. https://doi.org/10.1016/j.ijmedinf.2022.104689
6. Piliuk K, Tomforde S. Artificial intelligence in emergency medicine: a systematic literature review. Int J Med Inf. 2023;179:105274. https://doi.org/10.1016/j.ijmedinf.2023.105274
7. Cellina M, Cè M, Irmici G, Ascenti V, Caloro E, Bianchi L, et al. Artificial intelligence in emergency radiology: where are we going?. Diagnostics. 2022;12(12):3223. https://doi.org/10.3390/diagnostics12123223
8. Colakca C, Ergın M, Ozensoy HS, Sener A, Guru S, Ozhasenekler A. Emergency department triaging using ChatGPT based on emergency severity index principles: a cross-sectional study. Sci Rep. 2024;14(1):22106. https://doi.org/10.1038/s41598-024-72793-0
9. Castelvecchi D. Can we open the black box of AI?. Nature. 2016;538(7623):20–3. https://doi.org/10.1038/538020a
10. Goddard K, Roudsari A, Wyatt J. Automation bias and trust in clinical decision support systems: a systematic review. BMC Med Informat Decis Making. 2012;12:99. https://doi.org/10.1186/1472-6947-12-99
11. Loh E, Clark J, Sia CH. Clinicians' trust and acceptance of artificial intelligence in clinical decision-making: a cross-sectional survey. BMJ Health Care Inf. 2023;30(1):e100708. https://doi.org/10.1136/bmjhci-2022-100708
12. Alghamdi BA, Alkhwaiter TA, Qassim AJ, et al. Perception and awareness of emergency medicine specialists toward artificial intelligence integration in the Riyadh region, Saudi Arabia. Int J Med Dev Ctries. 2024;8(9):2250–9. https://doi.org/10.24911/IJMDC.51-1718105777
13. Ahun E, Demirci H, Yilmaz S. Perceptions and concerns of emergency medicine clinicians about artificial intelligence use during epidemic triage. Front Public Health. 2023;11:1187456. https://doi.org/10.3389/fpubh.2023.1187456
14. Stewart J, Eastwood K, Gordon C. Attitudes towards artificial intelligence in emergency medicine: a qualitative study of emergency clinicians in Australia and New Zealand. Emerg Med Australas. 2024;36(2):243–51. https://doi.org/10.1111/1742-6723.14343
15. Fritsch SJ, Hamet P, Ellahham S, Piper J. Attitudes and perceptions of artificial intelligence in healthcare: a scoping review. Front Digit Health. 2022;4:1024453. https://doi.org/10.3389/fdgth.2022.1024453
16. Chen M, Hao Y, Cai Y, Li S. Acceptance of clinical artificial intelligence among physicians and medical students: a systematic review. BMC Med Informat Decis Making. 2022;22(1):276. https://doi.org/10.1186/s12911-022-02015-w
17. Eastwood K, Gordon C, Stewart J, et al. Needs and expectations for artificial intelligence in emergency medicine: a mixed-method survey of physicians. BMC Health Serv Res. 2023;23(1):1156. https://doi.org/10.1186/s12913-023-10148-1
18. Medscape News. Majority of doctors worry about artificial intelligence driving clinical decisions, survey shows [Internet]. 2023 [cited 2025 Jan 2].