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Exploring Romanian Healthcare Worker Perceptions of AI Integration in Resource-Variable Clinical Settings: A Cross-Sectional Survey Study

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Abstract

Background: Artificial intelligence (AI) is rapidly transforming healthcare through applications that improve diagnostic support, workflow efficiency, and clinical documentation. However, most AI development and implementation have occurred in high-income countries, and little is known about healthcare workers' perceptions of AI in resource-variable clinical settings. This study evaluated healthcare workers' exposure to and perceptions of AI at a regional hospital in Northeastern Romania. **Methods:** A cross-sectional survey study was conducted in June 2025 at Mavromati Emergency County Hospital to explore healthcare worker perceptions of Artificial Intelligence into clinical care. Paper surveys with English and Romanian Language translations were distributed to physicians, nurses, residents, and practicants across multiple hospital departments. The questions included multiple-choice, Likert-style, and select-all-that-apply responses. Participation was voluntary and anonymous. Completed surveys were manually entered into Microsoft Excel, and descriptive statistical analysis was performed using frequencies and percentages. **Results:** One hundred healthcare professionals completed the survey, including 62 nurses and 32 physicians. Most respondents (61%) reported no prior exposure to AI in clinical practice, while attitudes toward AI were predominantly neutral (58%). Documentation (33%), administrative tasks (23%), and patient follow-up (20%) were identified as the most valuable potential applications of AI. Nurses were significantly more likely than physicians to identify patient safety as a concern (56% vs. 31%, $p = 0.020$), whereas

physicians more frequently reported concerns regarding misdiagnosis (59% vs. 31%, p = 0.007). Hands-on demonstrations (51%), additional training (48%), and institutional policies (39%) were the most identified resources needed to support AI implementation. **Conclusion:** Healthcare workers in this Romanian clinical setting demonstrated cautious optimism toward AI despite limited prior exposure. Respondents were most receptive to AI applications that improve workflow efficiency while preserving clinician oversight, with concerns centered on patient safety, diagnostic reliability, and maintaining the clinician-patient relationship. Successful AI implementation in resource-variable healthcare settings should prioritize practical training, clear governance, and gradual integration of workflow-support applications before broader clinical deployment. **Study Design:** Cross-sectional survey study.

Keywords

Artificial Intelligence, Healthcare Professionals, Technology Acceptance, Digital Health, Romania

1. Introduction

Artificial Intelligence (AI) has been used in healthcare as early as the 1960's in the form of the first medical chatbot, which simulated a psychotherapist [1]. In its early days, AI was a tool that followed rule-based systems, being used sparingly [2]. However, recent years have shown a drastic increase in the use of and research into AI systems in healthcare. From 2024 to 2025, there was a five-fold increase in AI adoption rates in healthcare [3]. Healthcare systems adopt AI for a variety of reasons including diagnostic support, predictive analytics, and workflow optimization. Specifically, specialties such as radiology, pathology, dermatology, and cardiology have integrated AI to optimize early detection and diagnoses of diseases [4] [5]. AI tools have shown potential in increasing diagnostic accuracy in these specialties. Across randomized-control trials, ~80% of AI-assisted interventions outperformed standard clinical care and led to positive primary endpoints as it related to diagnostic performance [6] [7]. By reducing administrative burden and documentation time, AI allows clinicians to devote more time to direct patient care. This increased efficiency has the potential to improve patient experiences, enhance quality of care, and reduce physician burnout [4] [8] [9].

However, despite its effectiveness and increasing utility, AI development and implementation have been limited to high-income countries (HICs) [10]. This is largely attributable to greater variability in available resources across lower-income countries, which can make widespread implementation of AI technologies more challenging. In turn, this leads to slower adoption and fewer validation studies involving AI in these countries. As a result, the perspectives of healthcare workers in these settings remain underrepresented in recent literature and development strategies.

To move towards mitigating this disparity in access to AI tools, it is crucial to analyze provider attitudes towards AI integration. The success of implementation of these technologies in the future relies on provider acceptance and willingness to utilize these tools to their maximum potential and in everyday practice. As has been shown in HICs, successful AI integration specifically depends on provider trust, perceived usefulness, and perceived safety. Prior studies in these areas show that there is variability in acceptance and concerns about misdiagnosis, patient safety, loss of autonomy, and the erosion of elements of human connection. Dr. Steven Lin, a practicing Family Medicine Physician at Stanford Medicine, summarizes this cautious optimism towards AI: "For AI to add the most value…It needs to support, not supplant, the patient-physician relationship…AI will be most effective when it enhances physicians' ability to focus their full attention on the patient…towards personalized care." As further illustrated, provider perception is one of the most important determinants of a successful adoption of AI in healthcare.

One such European country with resource variability and without wide-spread implementation of AI tools in healthcare is Romania. Specifically, in smaller cities and towns outside of the capital city, Bucharest, there is variable and, in some cases, no implementation of AI tools in healthcare settings [11]. The country has a mix of urban academic centers where these technologies are more common, and rural under sourced areas which they are not. Romania faces similar challenges as HICs when it comes to healthcare in general: workforce strain, administrative burden, and infrastructure limitation [12] [13]. Due to this, Romania represents a transitional healthcare system that may reflect dynamics also seen in broader low-resource settings. One city that will be explored further is Botoşani, which is a smaller sized Romanian city with a population of 110,000, compared to the 2.1 million of the capital city, Bucharest. This leads to a drastic difference in access to resources as compared to larger urban centers.

This nature of Romania, and more specifically Botoşani, makes it an ideal place to study provider attitudes towards AI technologies in healthcare. However, there is a serious gap in literature in this area. There is limited data on both AI exposure among Romanian healthcare workers and attitude across different provider roles (nurses vs. physicians). Even fewer studies examine how these providers' perceptions may inform implementation in a resource constrained environment. This study aims to evaluate healthcare workers' exposure and perceptions of AI in the more rural Romanian healthcare setting. Further, it seeks to define differences in attitudes across professional roles and consider the implications of these findings to other lower-income and lower-resource healthcare settings around the world.

2. Methods

2.1. Study Design

This study was a cross-sectional survey-based study conducted in June 2025 at

Mavromati Emergency County Hospital in Botoşani, Romania to evaluate healthcare workers' perceptions of artificial intelligence integration into clinical practice. The study aimed to assess familiarity with AI technologies, perceived benefits and concerns regarding AI implementation, and potential barriers to adoption and healthcare worker acceptance within a resource-variable healthcare setting.

2.2. Participants and Survey Distribution

Participants included healthcare personnel working at the hospital. This included physicians, residents, nurses, and practicants. Convenience sampling was utilized. Paper surveys were distributed by hand by members of the research team to all accessible departments of the hospital (AP, LF, RM). In some departments, surveys were distributed directly to staff members, while other departments were provided with a stack of surveys for voluntary completion at a later time. Participants were given approximately a week to complete the surveys before they were collected.

2.3. Questionnaire

The questionnaire (Supplement 1) was newly created with both English and Romanian translations on each question to increase accessibility for participants. Romanian translation was verified by a Romanian physician collaborator (RM), for accuracy. The survey consisted of questions regarding participant background, prior AI exposure, comfort with AI, trust in AI, concerns, and educational or institutional resources needed to support AI use. Survey questions utilized multiple-choice, Likert-style, and select-all-that-apply response formats. Optional written comments were collected but were not included in the final analysis.

2.4. Data Collection and Analysis

Participation in the study was voluntary and anonymous. No identifying personal information was collected. Completed paper surveys were collected and manually entered into Microsoft Excel for **analysis. Descriptive statistical analyses were** performed using Excel. Responses were summarized using frequencies and percentages. Exploratory comparisons between nurses and physicians were performed for responses regarding concerns about AI implementation and resources needed for AI integration. For select-all-that-apply questions, the number of participants selecting each response option was compared between nurses and physicians using Pearson's chi-square test. Statistical significance was defined as a two-sided p-value < 0.05. The six respondents from other healthcare professions were included in the overall descriptive analyses but excluded from nurse-physician comparisons. There were no missing responses for the items included in these comparisons. The profession-specific comparisons were exploratory and were not pre-specified. No adjustment for multiple comparisons was applied; therefore, individual p-values should be interpreted cautiously.

2.5. Ethical Considerations

Participation was voluntary and anonymous. Completion of the survey implied consent via the statement at the beginning of the questionnaire as seen in Supplement 1. No identifying personal information was collected from the participants.

3. Results

3.1. Participant Characteristics

Mavromati Emergency County Hospital employs approximately 1200 healthcare providers. Of these, 150 questionnaires were distributed based on availability and departmental access. A total of 100 healthcare professionals completed the survey. This yielded a response rate of 66.7% among healthcare professionals who were offered a questionnaire. Participants included 62 nurses, 32 physicians, and 6 respondents from other healthcare professions. Respondents represented more than 10 clinical specialties, with General Surgery (19%), Internal Medicine (18%), Orthopedics (14%), and ENT (11%) comprising the largest specialty groups. Surgical specialties accounted for 47% of respondents, while 42% practiced in non-surgical specialties. Most participants (60%) had worked in their current professional role for more than 10 years (Table 1). Departments that were accessed for distribution of the survey included Cardiology, Endocrinology, ENT, General Surgery, Hematology, Internal Medicine, Neurology, Oncology, Orthopedics, Plastic Surgery, and Surgery II. Inaccessible departments in the hospital included the Anesthesiology, Emergency Medicine, Radiology, and Pathology Departments.

Table 1. Participant demographics (N = 100).

Characteristic	n (%)
Profession	
Nurses	62 (62%)
Physicians	32 (32%)
Other	6 (6%)
Years in practice	
<1 year	3 (3%)
1 - 5 years	13 (13%)
6 - 10 years	23 (23%)
>10 years	60 (60%)
No response	1 (1%)
Specialty	
Surgical	47 (47%)
Non-surgical	42 (42%)
No response	11 (11%)

3.2. Previous Exposure to Artificial Intelligence

Sixty-one participants (61%) reported that they had never used or observed AI tools in healthcare, while 25 participants (25%) reported previous exposure. Twelve participants (12%) were unsure whether they had encountered AI in clinical practice (Table 2).

Table 2. Previous exposure to AI.

Response	n (%)
Yes	25 (25%)
No	61 (61%)
Not sure	12 (12%)
No response	2 (2%)

3.3. Attitudes toward Artificial Intelligence

Most respondents reported neutral comfort with AI in clinical practice (58%), while 29% reported being somewhat or very comfortable using AI tools. Eight percent reported being somewhat or very uncomfortable (Table 3).

When asked whether they trusted AI to assist in clinical decision-making, 22% reported that they would trust AI, 43% indicated they would sometimes trust AI, and 32% reported that they would not trust AI.

Table 3. Attitudes toward AI.

Variable	n (%)
Comfort using AI	
Very comfortable	8 (8%)
Somewhat comfortable	21 (21%)
Neutral	58 (58%)
Somewhat/Very uncomfortable	8 (8%)
No response	5 (5%)
Trust AI for clinical decisions	
Yes	22 (22%)
Sometimes	43 (43%)
No	32 (32%)
No response	3 (3%)

3.4. Perceived Clinical Applications of AI

Documentation was identified as the clinical task in which AI would be most ben-

eficial (33%), followed by administrative tasks (23%) and patient follow-up (20%). Diagnosis (13%) and triage (5%) were selected less frequently (Table 4).

Table 4. Clinical applications of AI.

Application	n (%)
Documentation	33 (33%)
Administrative tasks	23 (23%)
Patient follow-up	20 (20%)
Diagnosis	13 (13%)
Triage	5 (5%)
None	4 (4%)
Other	1 (1%)
No response	1 (1%)

3.5. Concerns Regarding AI Implementation

Loss of human connection between providers and patients was the most frequently reported concern regarding AI implementation (56%), followed by patient safety (47%) and misdiagnosis (40%).

In exploratory profession-specific analyses, nurses were significantly more likely than physicians to identify patient safety as a concern (**35/62 [56%] vs. 10/32 [31%]**, $p = 0.020$). Physicians were significantly more likely to report concern regarding misdiagnosis (**19/32 [59%] vs. 19/62 [31%]**, $p = 0.007$). No significant differences were observed between professions for data privacy, loss of human connection, or job security (Figure 1, Table 5).

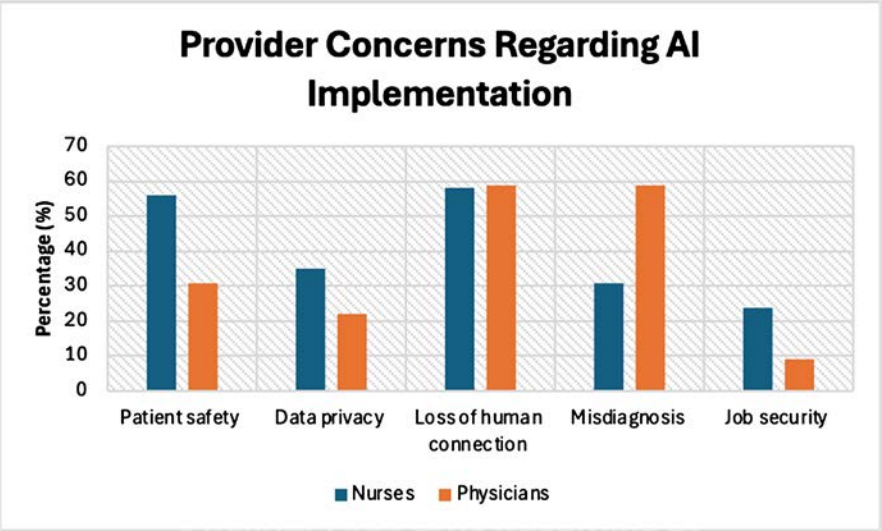


Figure 1. Provider concerns regarding AI implementation.

Table 5. Provider concerns regarding AI implementation.

Concern	Nurses n/N (%)	Physicians n/N (%)	*p*-value
Patient safety	35/62 (56%)	10/32 (31%)	0.020
Data privacy	22/62 (35%)	7/32 (22%)	0.176
Loss of human connection	36/62 (58%)	19/32 (59%)	0.903
Misdiagnosis	19/62 (31%)	19/32 (59%)	0.007
Job security	15/62 (24%)	3/32 (9%)	0.084

The six respondents from other healthcare professions were excluded from nurse-physician comparisons.

3.6. Preparedness for AI Integration

Hands-on demonstrations (51%) and additional training (48%) were the most commonly identified strategies to improve preparedness for AI implementation, followed by national or hospital policy development (39%).

In exploratory profession-specific analyses, physicians were significantly more likely than nurses to identify the need for institutional policy before implementation (**18/32 [56%] vs. 20/62 [32%]**, $p = 0.025$). No significant differences were observed between professions regarding the need for hands-on demonstrations or additional training. Although nurses were more likely than physicians to report that AI was unnecessary in clinical practice (**13/62 [21%] vs. 2/32 [6%]**), this difference was not statistically significant ($p = 0.065$) (Table 6).

Table 6. Resources needed for AI implementation.

Response	Nurses n/N (%)	Physicians n/N (%)	*p*-value
AI not needed	13/62 (21%)	2/32 (6%)	0.065
Hands-on demonstrations	32/62 (52%)	15/32 (47%)	0.663
National/hospital policy	20/62 (32%)	18/32 (56%)	0.025
More training	29/62 (47%)	17/32 (53%)	0.559

The six respondents from other healthcare professions were excluded from nurse-physician comparisons.

4. Discussion

This study evaluated healthcare workers' perceptions of artificial intelligence in a resource-variable healthcare setting in Northeastern Romania. Three principal findings emerged. First, most respondents reported little or no prior exposure to AI in clinical practice. Second, attitudes toward AI were largely neutral rather than strongly positive or negative, suggesting uncertainty more than resistance. Third,

respondents viewed AI most favorably as a tool to improve workflow through documentation, administrative tasks, and patient follow-up rather than as a replacement for clinical decision-making. Together, these findings indicate that AI exposure among surveyed healthcare workers was limited, while respondents were generally receptive to practical, supportive applications of the technology.

Although 61% of respondents reported never using or observing AI in healthcare, this finding should be interpreted cautiously. Neutral attitudes toward AI were far more common than negative attitudes, suggesting uncertainty among respondents despite limited prior exposure. Institutional availability and implementation of AI technologies were not directly assessed; therefore, the low level of reported exposure cannot be attributed specifically to a lack of institutional implementation or provider opposition. Similar observations have been reported in previous studies, where successful AI adoption depends not only on clinician acceptance but also on infrastructure, workflow integration, organizational support, and local validation [14] [15]. As AI becomes more widely available, increasing familiarity through gradual implementation may be as important as changing provider perceptions.

Respondents consistently identified documentation, administrative tasks, and patient follow-up as the areas where AI could provide the greatest benefit, while diagnosis and triage were selected much less frequently. This pattern suggests that clinicians currently view AI primarily as a tool to improve efficiency rather than replace clinical judgment. These findings are consistent with implementation trends in higher-resource healthcare systems, where AI has first been adopted to reduce documentation burden and streamline workflows. Studies of ambient AI documentation platforms have demonstrated reductions in documentation time and clinician workload while allowing providers to spend more time with patients [16]. Similarly, recent evidence reviews have identified documentation support as one of the most practical and well-established clinical applications of AI [17]. Within resource-variable healthcare settings**,** introducing AI through these lower-risk, high-value applications may represent **one potential** pathway toward broader adoption.

Exploratory comparisons between physicians and nurses also provide potential insight into future implementation strategies. Nurses were more likely to identify patient safety as a concern, whereas physicians expressed greater concern regarding diagnostic accuracy and misdiagnosis. Despite these differences, both groups ranked preservation of the clinician-patient relationship as one of their greatest concerns. These findings highlight that acceptance of AI depends not only on the technology itself but also on how it affects daily clinical practice and patient care. Similar differences have been reported in previous clinician surveys, which show that education, trust, and implementation readiness remain important barriers to AI adoption across professional groups [18] [19]. Rather than applying a single implementation strategy across all healthcare workers, future AI initiatives should consider the distinct responsibilities and concerns of different professional roles.

Training and organizational support emerged as the most actionable opportunities to facilitate AI adoption. More than half of respondents identified hands-on demonstrations or additional education as important resources for successful implementation, while physicians were more likely than nurses to emphasize the need for institutional policies in exploratory analyses. These findings suggest that increasing AI literacy alone is unlikely to be sufficient [20]. Successful implementation will also require clear governance, transparent institutional guidelines, and opportunities for clinicians to gain practical experience using AI within their own workflows [21]-[23]. Building familiarity through structured training while establishing clear expectations for safety, accountability, and appropriate use may help address many of the concerns identified in this study.

Loss of the clinician-patient relationship was the most frequently identified concern among both physicians and nurses, emphasizing that healthcare workers view AI as a tool that should support, rather than replace, direct patient care. This perspective aligns with current ethical guidance from the World Health Organization, which emphasizes that AI should strengthen human decision-making while preserving transparency, accountability, and patient autonomy [15] [24]. As healthcare systems continue to adopt AI technologies, maintaining clinician oversight and preserving meaningful patient interactions will likely remain essential for building both provider and patient trust.

This study has several limitations. First, it was conducted at a single hospital with a relatively small sample size, which limits generalizability beyond the surveyed hospital to other healthcare systems within Romania or internationally. The convenience-sampling approach and inability to access all hospital departments may also have introduced selection and nonresponse bias. Second, responses were self-reported and therefore subject to recall and response bias. Participants may also have interpreted the term "AI" differently depending on their prior experiences and familiarity with emerging technologies. Future studies should provide an operational definition to participants before completion of the survey. Additionally, profession-specific analyses were exploratory and involved multiple comparisons without adjustment, increasing the possibility of type I error; these findings should therefore be interpreted cautiously. Institutional availability, existing implementation, and access to AI technologies were not directly assessed; therefore, the reasons underlying respondents' limited reported exposure to AI cannot be determined from this study. Finally, the cross-sectional design captures provider perceptions at a single point in time and cannot determine how attitudes may change following education, institutional implementation, or direct experience with AI.

Future research should expand these findings through larger, multi-center studies that include diverse healthcare settings and professional roles. Evaluating differences between urban and rural hospitals may be particularly valuable given the variability in technology adoption across healthcare systems. Intervention studies examining AI education, hands-on training, and pilot implementation

programs would also help determine whether increased exposure improves clinician confidence and acceptance. In addition, incorporating patient perspectives will be important, as successful integration of AI into healthcare will ultimately depend on trust from both clinicians and the patients they serve.

5. Conclusion

This study found limited reported exposure to AI among surveyed healthcare workers at a single hospital in Northeastern Romania, alongside generally neutral attitudes toward its integration into clinical practice. Respondents were most receptive to AI applications that support workflow efficiency, especially documentation, administrative tasks, and patient follow-up, while remaining more cautious about AI-driven clinical decision-making. Respondents identified training, institutional guidance, and opportunities for practical experience as important resources for future AI implementation. Successful implementation in resource-variable healthcare settings may benefit from practical training, transparent policy, local validation, and a human-centered approach that uses AI to supportively augment clinical judgment and the clinician-patient relationship.

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Author Contributions

AP, LF, and RM contributed to data collection and survey administration, with RM also providing verification of the Romanian-language survey translation. EO and BK contributed to data analysis and manuscript writing. AH contributed to manuscript writing and served as the senior author, providing overall guidance and supervision for the project.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

AI in Clinical Practice—Staff Survey

Percepţiile Personalului Medical despre Inteligenţa Artificială în Practica Clinică

English:

By completing this survey, you agree to participate voluntarily in a research study about perceptions of artificial intelligence (AI) in clinical care. Your responses are anonymous and will be used only for educational and research purposes. You may skip any question or stop at any time without penalty. No personal identifying information will be collected.

Romanian:

Prin completarea acestui chestionar, sunteți de acord să participați voluntar la un studiu de cercetare privind percepțiile asupra inteligenței artificiale (IA) în îngrijirea medicală. Răspunsurile dumneavoastră sunt anonime și vor fi utilizate exclusiv în scopuri educaționale și de cercetare. Puteți omite orice întrebare sau puteți opri completarea chestionarului în orice moment, fără consecințe. Nu se vor colecta informații personale de identificare.

Section 1: Background/Informaţii generale

1) What is your role?/Care este rolul dumneavoastră?

☐ Physician/Medic

☐ Resident/Rezident

☐ Nurse/Asistent medical

☐ Administrative staff/Personal administrative

☐ Other/Altul: _____

2) In which department do you work?/În ce departament lucraţi?

_____

3) How many years have you worked in healthcare?/De câţi ani lucraţi în domeniul sănătăţii?

☐ <1 year/<1 an

☐ 1 - 5 years/1 - 5 ani

☐ 6 - 10 years/6 - 10 ani

☐ >10 years/>10 ani

Section 2: AI Experience & Attitudes/Experienţă şi atitudini faţă de AI

4) Have you ever used or seen AI tools used in medical care?/Aţi folosit sau aţi văzut vreodată programe AI utilizate în îngrijirea medicală?

☐ Yes/Da

☐ No/Nu

☐ Not sure/Nu sunt sigur(ă)

5) How comfortable are you with using AI tools in your clinical work?/Cât de confortabil vă simţiţi să folosiţi programe AI în activitatea clinică?

☐ Very comfortable/Foarte confortabil(ă)

☐ Somewhat comfortable/Destul de confortabil(ă)

☐ Neutral/Neutru(ă)

☐ Uncomfortable/Inconfortabil(ă)

☐ Very uncomfortable/Foarte inconfortabil(ă)

6) Do you trust AI to assist in clinical decision-making?/Aveţi încredere în AI pentru a ajuta în luarea deciziilor clinice?

☐ Yes/Da

☐ Sometimes/Uneori

☐ No/Nu

7) Where do you think AI could be most helpful in your department?/Unde credeţi că AI ar putea fi cel mai util în departamentul dumneavoastră?

**(complement multiplu)

☐ Diagnosis/Diagnostic

☐ Documentation/Documentare

☐ Triage/Triaj

☐ Patient follow-up/Monitorizarea pacienților

☐ Administrative tasks/Sarcini administrative

☐ Other/Altul: _____

8) What are your biggest concerns about AI in healthcare? (select all)/Care sunt cele mai mari preocupări ale dumneavoastră legate de AI în sănătate? (selectaţi tot ce se aplică)

☐ Patient safety/Siguranta pacientilor

☐ Data privacy/Confidențialitatea datelor

☐ Loss of human connection/Pierderea relatiei umane

☐ Job security/Siguranta locului de muncă

☐ Misdiagnosis/Diagnostic gresit

☐ Other/Altul: _____

9) What would help you feel more prepared to work with AI?/Ce v-ar ajuta să vă simţiţi mai pregătit(ă) să lucraţi cu AI?

☐ More training/Mai multă instruire

☐ Hands-on demonstrations/Demonstrații practice

☐ National or hospital policy/Politici clare la nivel național/spitalicesc

☐ I don't think AI is needed/Nu cred că AI este necesar

☐ Other/Altul: _____

Section 3: Optional Comment/Comentariu opţional

10) Do you have any thoughts about the future of AI in your field?/Aveţi păreri despre viitorul AI în domeniul dumneavoastră?