

# How do doctors perceive AI in their medical practice?

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## Abstract

Although artificial intelligence (AI) has proven to be valuable in various sensitive domains such as healthcare, its application in clinical practice is still not ubiquitous. We conducted an online survey involving clinicians and medical physicists from Italian professional medical associations to investigate the drives and the obstacles to the use of AI in medical practice. Increased efficiency is the doctors' main drive to use AI systems, while the main obstacle is its availability in clinical facilities. Caution is recommended by respondents for both AI tools developers and users.

## Keywords

AI, Responsibility, AI reliability and robustness, Human cognition-aware AI, Collaborative AI, Explainable AI, Participatory AI, barriers to AI adoption

## 1. Introduction

Healthcare has always been an area open to technological innovation to which the introduction of AI is no exception. For several decades, there has been talk of telemedicine and individualized therapy, and the use of AI for personalised medicine, where diagnoses and treatments are effectively tailored to individual patients, seems to be within reach. Among others, the AI potential relates to assistance in treatment planning and personalized care, acceleration of drugs and vaccines' discovery, accuracy of diagnoses, early disease detection, support to medical research and data analysis, reduction of doctors' time spent on routine tasks, and improvements in the doctor-patient relationships. However, little attention has been given to the changes in the medical practice. Adoption by doctors remains low due to algorithmic, legal, social and institutional barriers (Goldfarb et al., 2022 [1]).

*Algorithmic barriers* refer to the reproduction of existing inequalities due to biased training data and unfair modelling. Obermeyer et al. ([2]) show how an AI algorithm to make diagnoses assigned Afro-American patients the same level of health risk while they were suffering significantly worse health conditions than White patients.

*Legal barriers* point to privacy concerns and to legal implications for AI-assisted diagnostics. Although the EU AI Act promotes a safe and ethical use of AI in medicine by setting out stringent requirements, the ownership of health data and share of responsibility for AI-generated decisions between AI developers and AI end users remains unclear.

*Social and organizational barriers* point to a scant trust towards AI due to several reasons such as fear of job displacement, challenges to professional authority and prestige, lack of collaboration between the developers of the AI algorithms and the medical doctors, low availability of specific validation data for AI algorithms, and unfulfilled expectations such on the expected reduction in workload (European Society of Radiology 2022 [3]). To correctly frame the discussion on the use of AI in the clinical practice, an important distinction is often missing between trust (generally understood as a social attitude, a normative, emotional, expectation towards an entity and its performance) and trustworthiness (a

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quality or characteristic of an entity and its performance, which provides sufficient reason to justify the attitude of trust) (Starke et al. 2022 [4], Sartori et al., 2025 [5]). Moreover, a general positive attitude towards AI does not automatically translate into willingness to adopt AI (Schulz et al. 2023 [6]), but it is mediated by personal socio-technical imaginaries (Sartori and Bocca 2022 [7]), organizational settings and institutional practices (Elish and Watkins 2020 [8]).

*Institutional barriers* refer to management and technology availability within the organization.

## 2. Purpose

Given the potential significant barriers to the use of AI in medical practice, in this paper we investigate the important research question on the actual adoption of AI systems in the daily practice of medical doctors. We study this question in the context of Italy using an original survey instrument to investigate the different types of barriers that could prevent the adoption of AI in healthcare. The focus of our study are the *social*, *organizational* and *institutional* barriers.

## 3. Methods

We built the questionnaire in Qualtrics (<https://www.qualtrics.com/>) and administered the survey between January and November 2024 to a sample of medical doctors working in Italian hospitals. More than 300 doctors replied to the survey, but only 193 completed all mandatory questions. The sample includes 57 Medical Physicists, 39 Radiologists, 15 Nuclear Medicine specialists, 20 Neurologists, 4 Oncologists, 4 Radiotherapists, and 54 Doctors with a different specialization.

The questionnaire is organized in five sections: 1. Perceptions, attitudes and awareness of AI; 2. Socio-technical imaginaries of AI; 3. Adoption of AI tools by the hospitals; 4. AI use in clinical practice by the medical doctors; 5. AI's potential adoption in clinical practice. We targeted the communities of doctors (Radiologists and Neuroradiologists, Nuclear Medicine doctors, Neurologists, Radiotherapists and Radiation oncologists, and Medical Physicists) through their National Professional Associations, which helped sponsoring the survey.

At the beginning of the questionnaire, before Section 1, we provided respondents with the following definition of Artificial Intelligence: "Artificial Intelligence (AI) refers to computer systems that are able to perform specific tasks and make decisions without being provided with explicit instructions and that, through a process of learning from data, are able to make predictions independently from human intervention". Providing this general definition of AI ensures comparability of responses across survey's respondents independently of the different topics and specific AI instruments they may be using.

## 4. Results

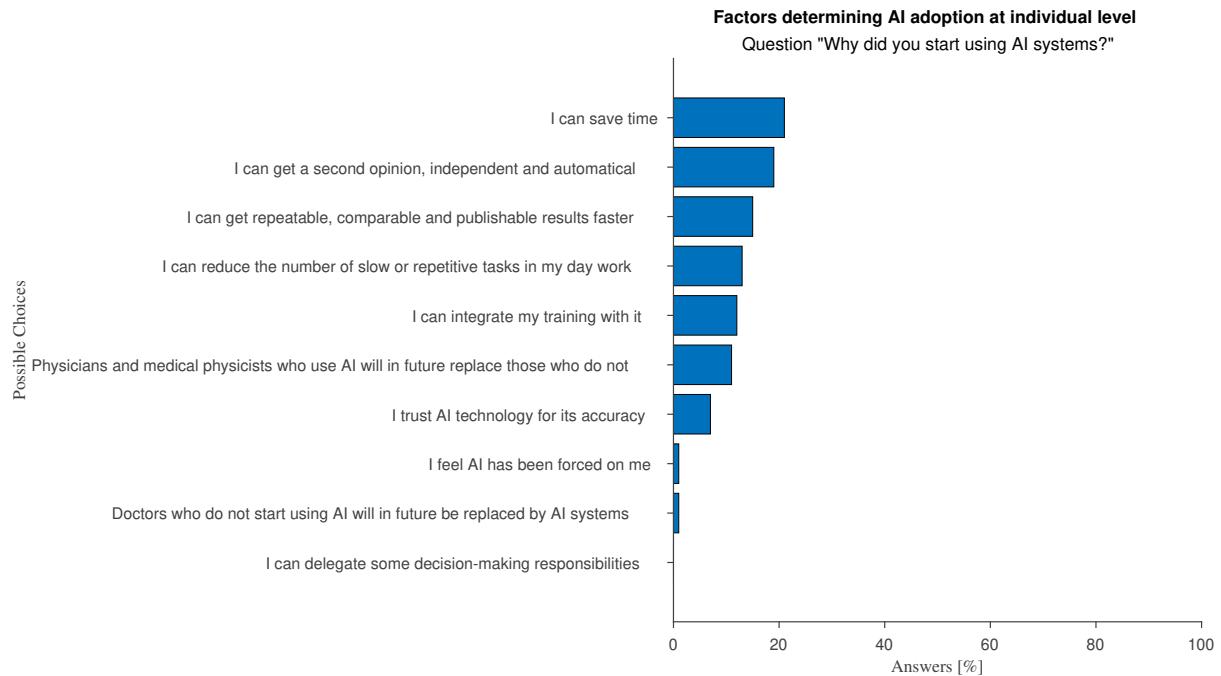
### 4.1. AI adoption

Figure 1 shows the main reasons that drove doctors to start including AI tools in their work practice. Participants seem to value the efficiency of AI, recognizing that it can help accelerate the work processes (answers "I can save time", "I can get repeatable, comparable and publishable results faster" and "I can reduce the number of slow and repetitive tasks in my daily work"). Another key driver is Trust (answers "I can get a second opinion, independent and automatic" and "I trust AI technology for its accuracy").

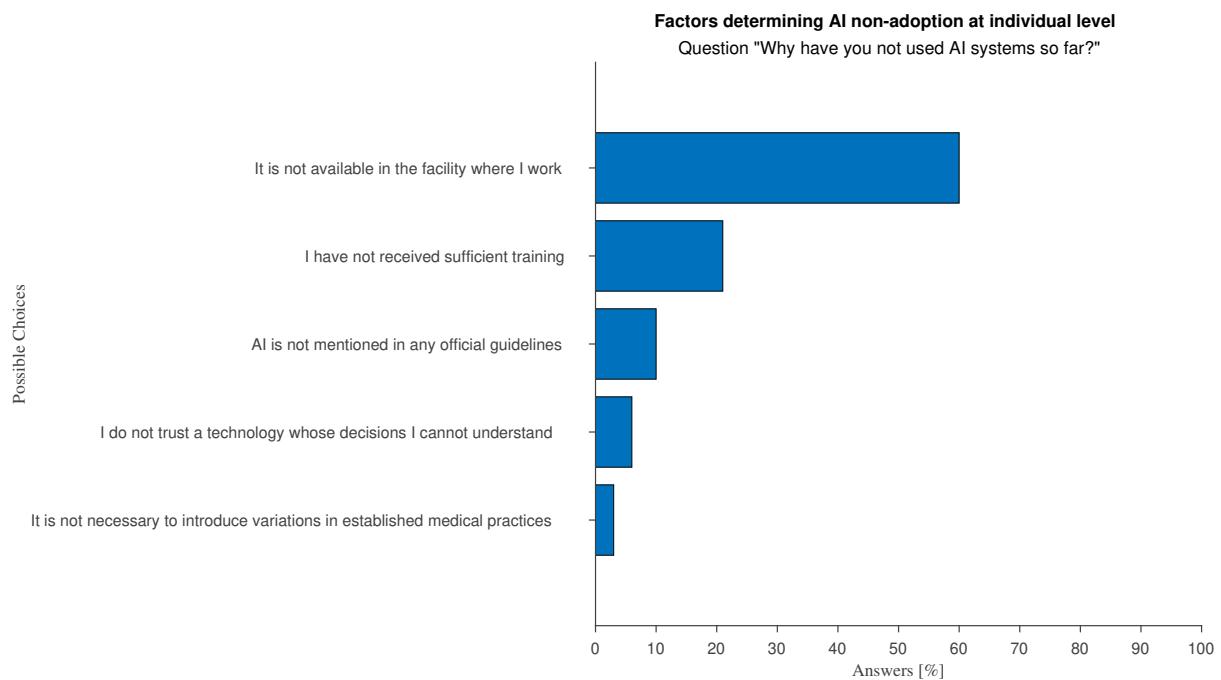
On the other hand, the large majority of respondents who do not use AI systems report that the main barrier they perceive to the use of AI in clinics is lack of availability: "It is not available in the facility where I work" (Fig. 2).

### 4.2. Tasks for which AI is employed

It is clear from the answers provided to the question "In which cases have you used an AI tool?" that our sample population is biased towards imaging-related professions: the vast majority of the respondents



**Figure 1:** Answers to multiple-choice question “Why did you start using AI systems?”.



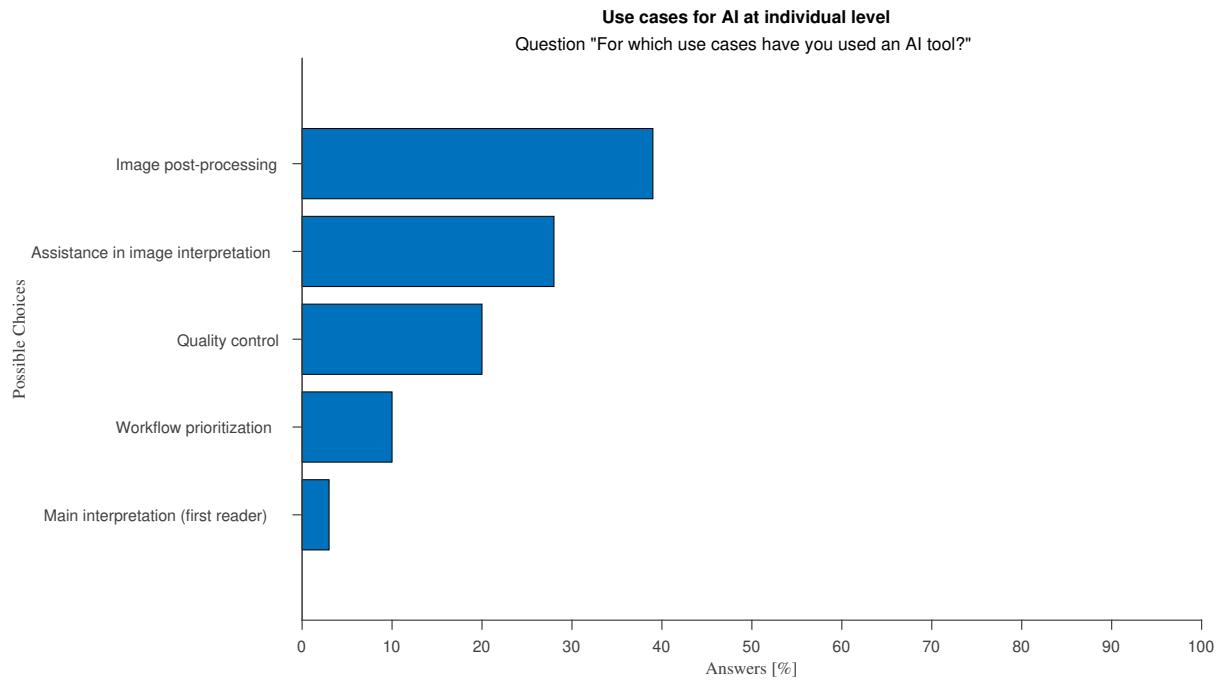
**Figure 2:** Answers to multiple-choice question “Why have you not used AI systems so far?”.

chose “Image post-processing” or “Assistance in image interpretation” (Fig. 3).

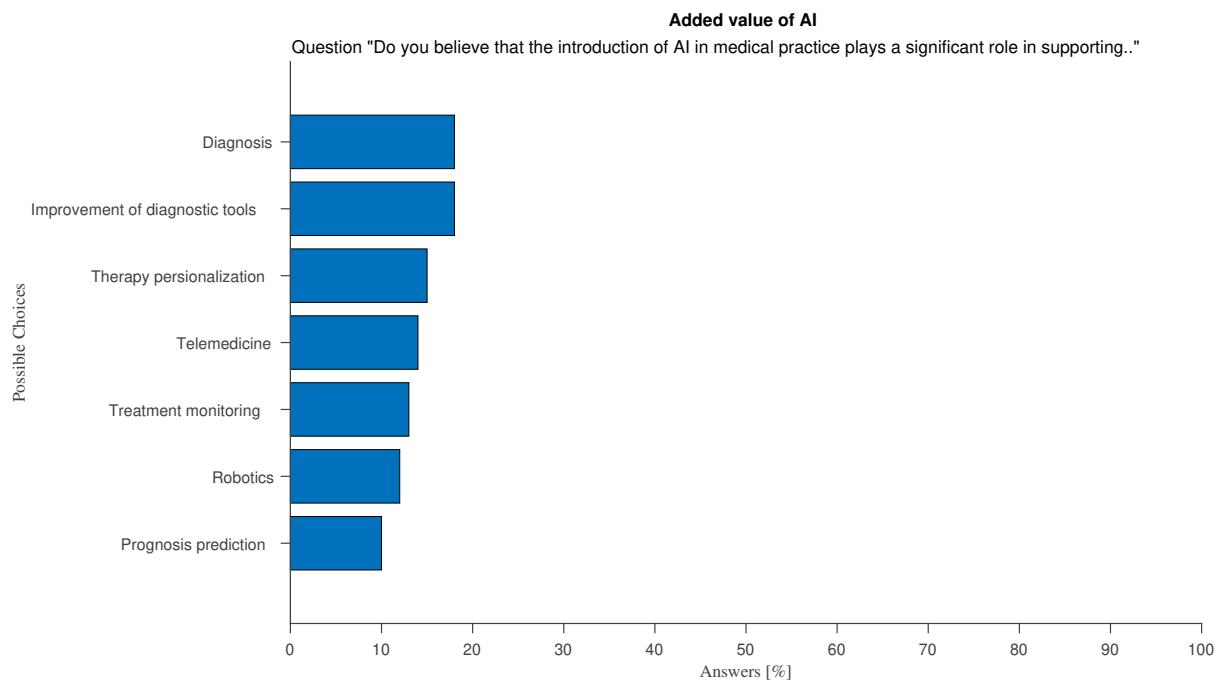
Doctors believe that the added value of data-driven tools lies where the largest body of data is: support to decision-making and support to diagnosis (Fig. 4).

#### 4.3. Who is responsible?

Responsibility of AI use is a debated theme: in our survey, we ask a question on who is responsible for AI errors and no clear consensus emerges among the respondents about the responsibility of mis-use or mis-functioning of AI. The majority of respondents think that clinicians have the main responsibility



**Figure 3:** Answers to multiple-choice question “In which cases have you used an AI tool?”.



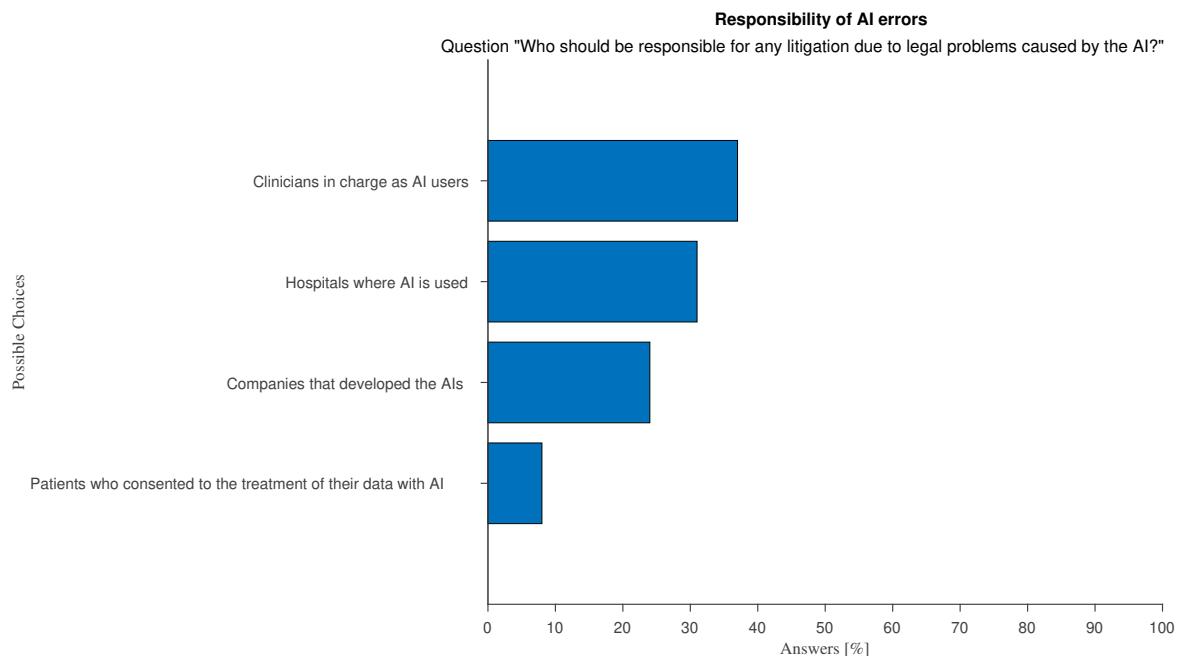
**Figure 4:** Answers to multiple-choice question “Where do you believe AI has the most added value?”.

since Figure 5 shows that over 35% of respondents state that the responsibility of AI errors is of clinicians in charge.

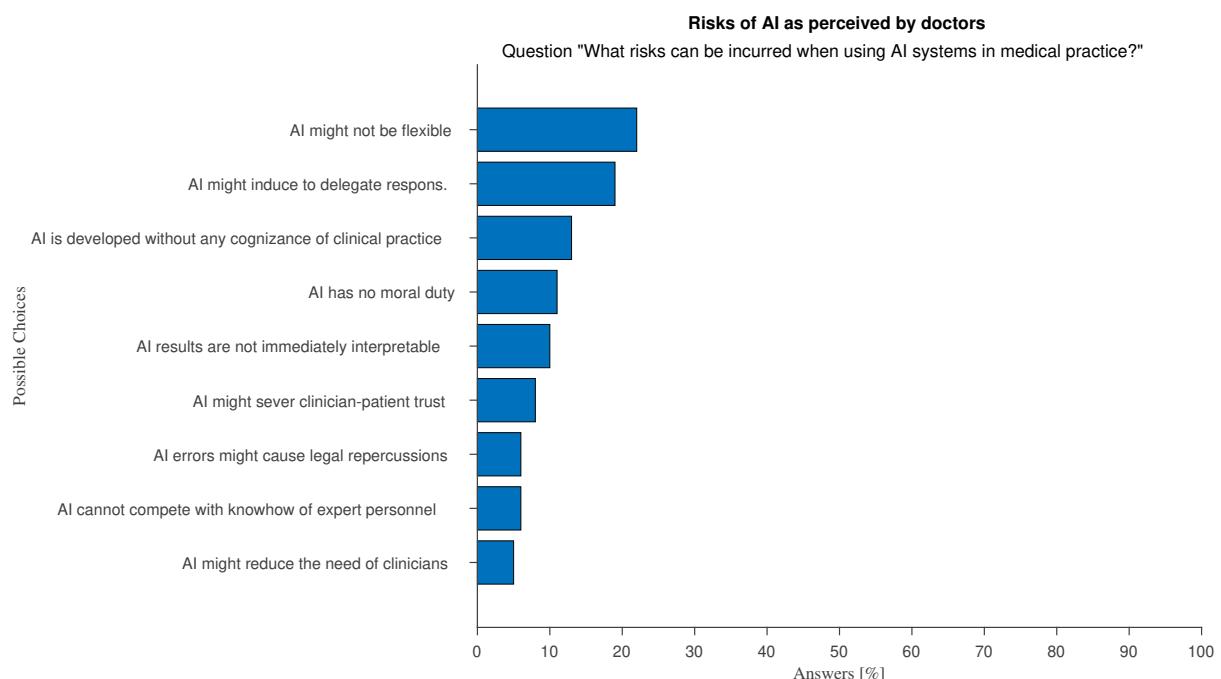
#### 4.4. Perceived risks of the use of AI

When asked about major perceived risks about AI use in their medical routine, doctors' opinions cluster around three main types of risk:

- Specialists' skills and competences cannot be equated by AI (answer “AI might not be flexible



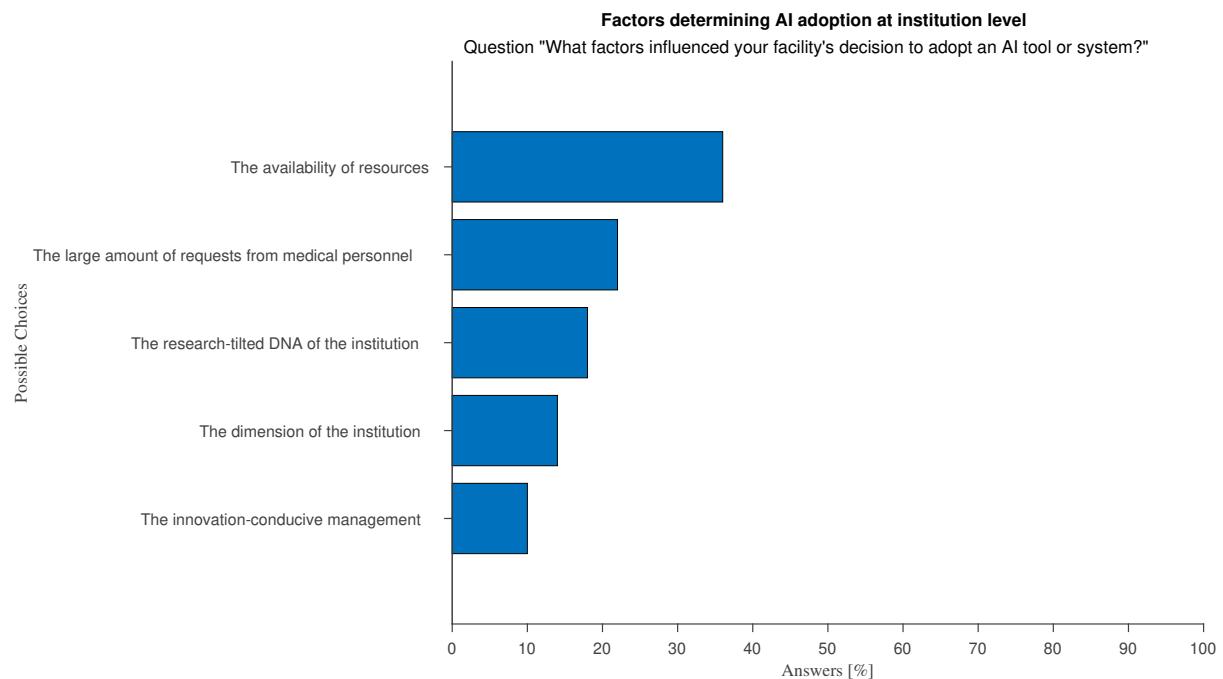
**Figure 5:** Answers to multiple-choice question “In your opinion, who should be responsible for any litigation due to legal problems caused by AI?”.



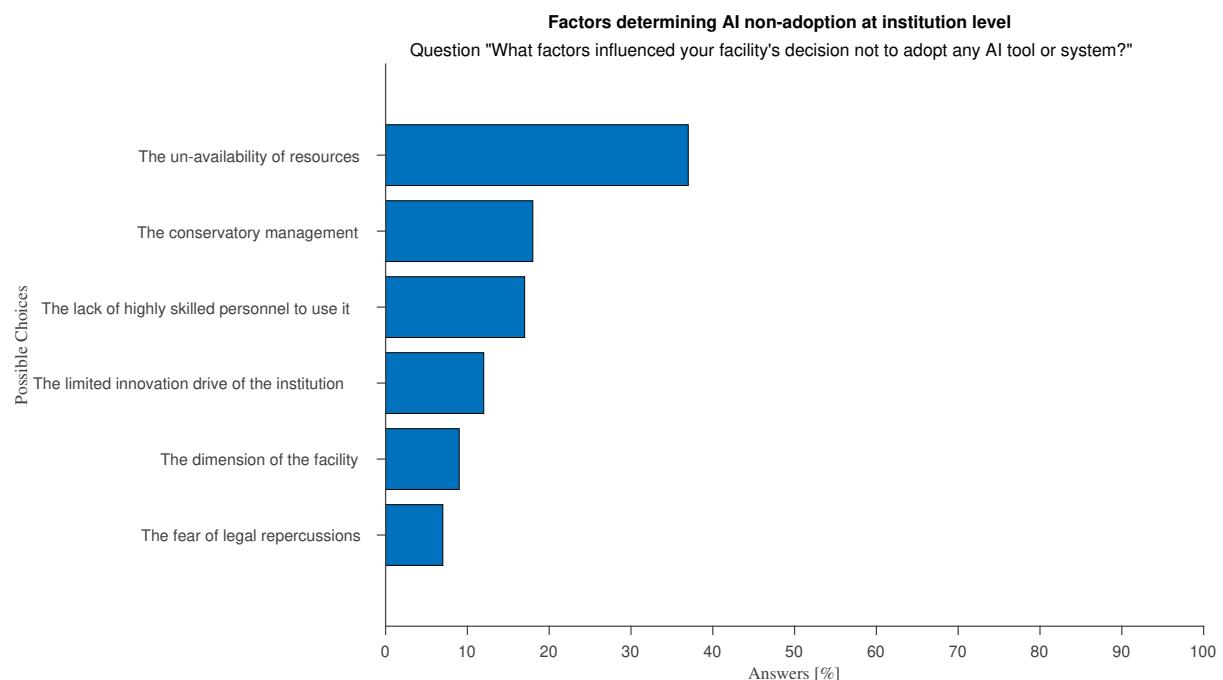
**Figure 6:** Answers to multiple-choice question “What risks can one incur when using AI systems in medical practice?”.

enough to cope with unknown data”; “AI cannot compete with known-how of expert personnel”)

- Doctors urge for a participatory design approach (“AI is developed without any cognizance of clinical practice”; “AI results are not immediately interpretable”)
- Doctors fear the fact that AI cannot be considered as a moral agent (“AI has no moral duty”; “AI might sever clinician-patient trust”).



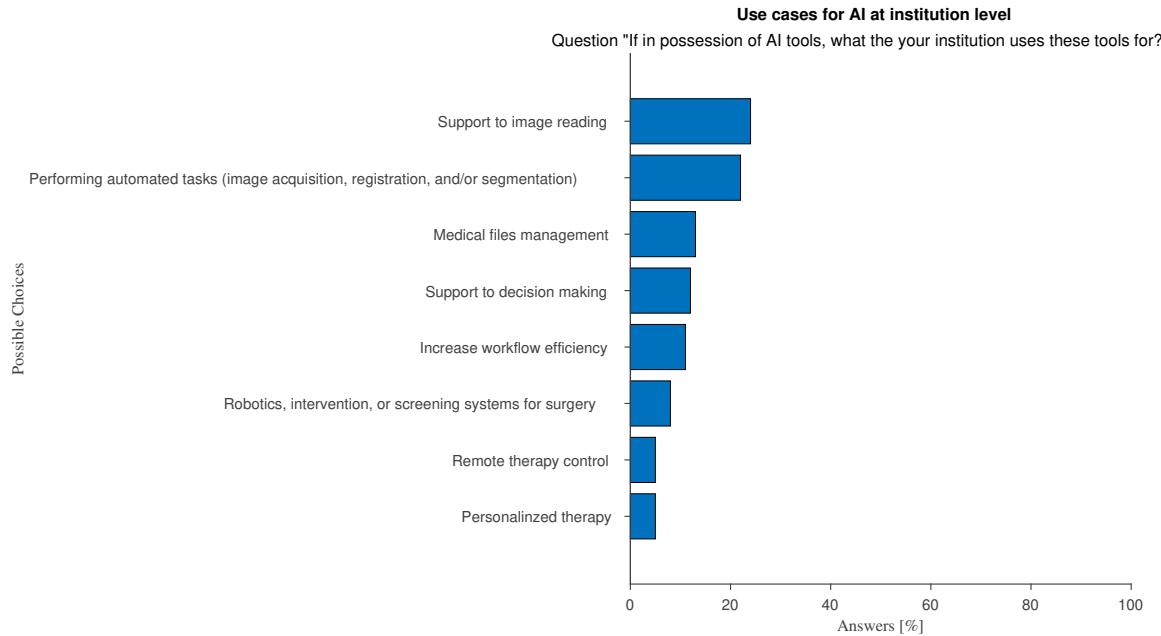
**Figure 7:** Answers to multiple-choice question “In your opinion, what factors influenced your organisation’s decision to adopt an AI tool or system?”.



**Figure 8:** Answers to multiple-choice question “In your opinion, what influenced your organisation’s decision NOT to adopt AI systems or tools?”.

#### 4.5. Adoption of AI in medical facilities

The main perceived barriers to adopting AI tools by hospitals and clinics are their economic resources and the attitude of their management. Large centres led by innovation-driven management tend to favour AI introduction, while in small and less wealthy centres AI faces more difficulties in fitting in (Fig. 7 and 8)



**Figure 9:** Answers to multiple-choice question “If equipped with AI, what does your facility use these tools for?”.

#### 4.6. The scope of using of AI

Doctors are asked “If your institution possesses AI tools, what are they used for?”. Due to the prevalence of radiologists in our sample population, answers relating to imaging-related tasks (e.g. “Support in imaging reading” and “Performing automated tasks”) are the most common (Fig. 9).

#### 4.7. Reactions to unexpected AI predictions

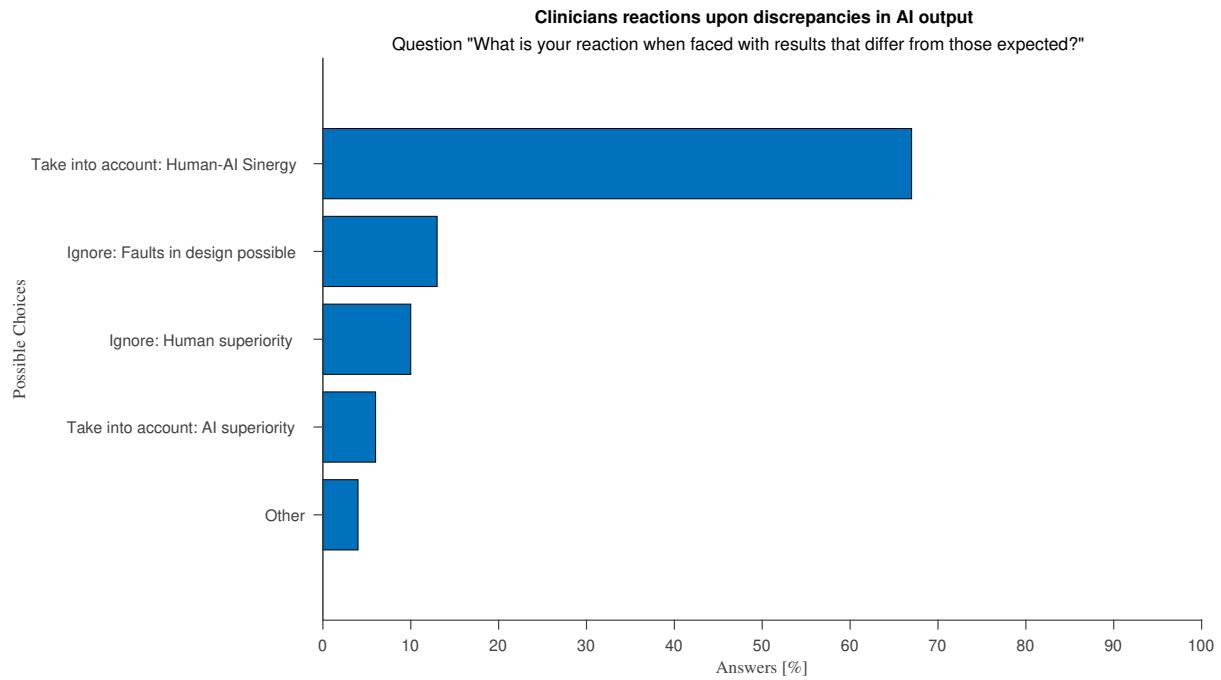
AI tools are often used to support decision making. This raises an important question: how do medical professionals respond when AI-generated results contradict their pre-existing opinions? To explore this, the survey asked: “What is your reaction when confronted with unexpected results from AI systems?”. Respondents could choose one of the following options: “I consider discrepancies to be ignored, as I believe in the superiority of humans over the automated system”; “I consider discrepancies to be ignored because, as I believe that automated systems are always prone to faulty the design”; “I consider discrepancies to be ignored because, as I believe in the superiority of automatic systems over humans in certain situations”; “I consider discrepancies to be taken into account, as I believe in complementarity between humans and automatic systems”.

Results (Fig 10) show that the vast majority of doctors are inclined to actively investigate the reasons behind the conflicting output and decide whether to revise their opinions accordingly or to disregard the AI output. This tendency seems to be shared by doctors no matter the level of familiarity with AI in their work environment.

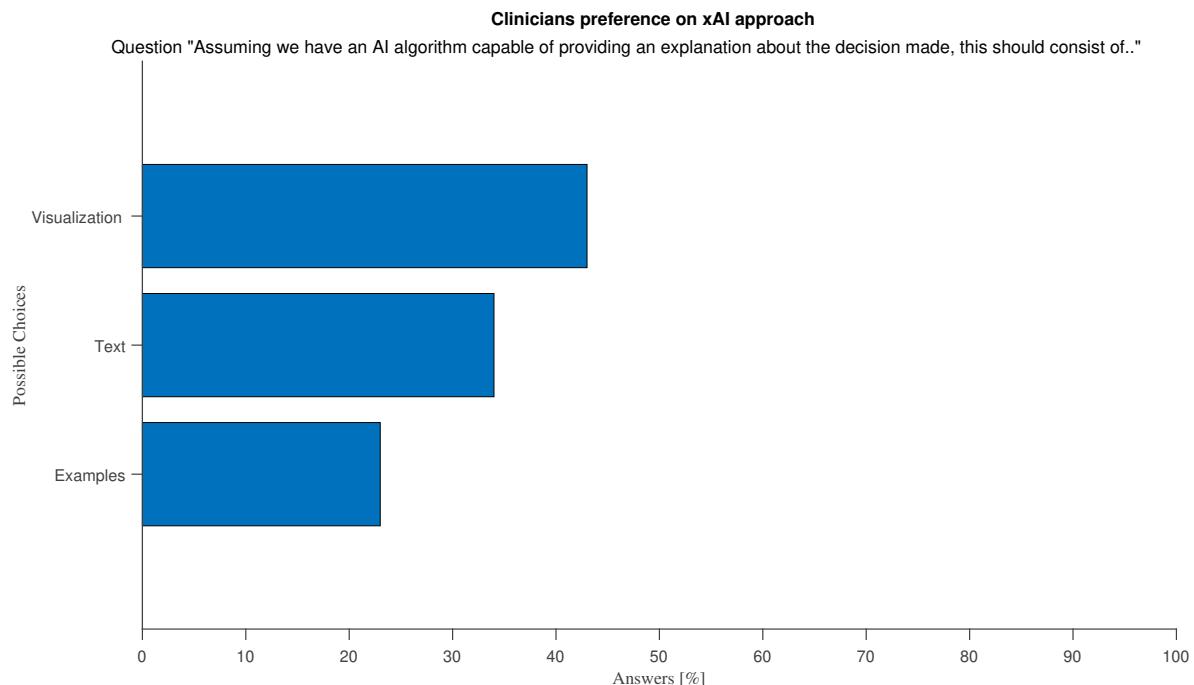
#### 4.8. Relevance of AI explainability

The term “Explainable AI” (xAI) refers to the techniques that aim to make AI tools more transparent to users, providing them insights on their decision process. This is of utmost importance in the medical environment where the final users have to make critical decisions based on the output of automated tools and shall thus be made aware of the internal decision-making pipeline. Explainability is also said to be a way to increase trust in AI tools (Markus et al., 2021 [9]).

With an eye to software development, we asked doctors which method of explainability would be the most effective. The optional question “Assuming we have an AI algorithm capable of providing an explanation about the decision made, this should consist of..” let users choose among the traditional



**Figure 10:** Answers to question “What is your reaction when confronted with results other than expected in the use of AI systems?”.



**Figure 11:** Answers to optional question “Assuming we have an AI algorithm capable of providing an explanation about the decision made, this should consist of...”.

xAI approaches: “Text: AI explains in natural language why it made that decision”, “Visualization: AI shows the variables/regions of the image that the algorithm considered most important in its decision” and “Examples: AI explains the decision by presenting similar cases and/or counter-examples”. Almost all clinicians selected more than one answer. A slight preference is expressed for the visual approach to xAI (Fig. 11). This might be due to imaging-based bias in survey population, where, additionally, by-example approaches cannot always be applicable.

## 5. Discussion

Responses to our survey indicate that doctors would like to see a paradigm shift in AI development with medical experts favouring a participative approach, which includes being involved by software developers at the stage of requirements' specification, algorithms development, results presentation and validation.

The development process could involve human decision-makers in one or both of the following two steps: data preparation for AI training and outputs' interpretation. Support to data preparation for training AI models can be provided by selecting, sorting or interactively and iteratively annotating data ("active learning"), while correcting or ranking model predictions can be of help for the enhancement of outputs' interpretation (Budd et al., 2021 [10]).

In the most relevant use case for our sample population (i.e., using AI to support imaging data interpretation or manipulation), the final judgment of the AI user will also be based on other factors that are difficult to measure, such as the current state of the patient. Therefore, the most important goal of AI can be to provide "recommendations" that inform the decision-making process.

## 6. Conclusions

The results of the survey show that several obstacles remain to the effective use of AI in clinical practice: for institutions (i.e., financial resources), for developers (i.e., transparency of software, dataset bias), for lawmakers (i.e., regulation on data, misuse responsibility).

According to medical specialists saving time is crucial, but efficiency cannot come at the expense of accuracy. Above all, results must be reliable, and rapid production is a secondary consideration.

The survey responses indicate a demand for a "participatory approach" to the development and use of AI in clinical practice: doctors will unlikely trust "blackbox" AI tools; rather, they expect to be involved in the development and validation of AI tools in order to ensure that these tools are actually useful in their work environment.

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## Declaration on Generative AI

The authors have not employed any Generative AI tools.

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