

# The Knowledge and Attitudes of the Public toward the Clinical Use of Artificial Intelligence

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## Abstract

**Aim:** This study aims to explore the knowledge and attitudes of the public toward the clinical use of artificial intelligence. **Materials and Methods:** This is a cross-sectional study that included an online questionnaire. The data were collected and analyzed using Excel software and represented as frequencies and percentages. **Results:** More than 55% of the respondents said that they had heard of artificial intelligence in medicine but only 3.17% said that they know about artificial intelligence in medicine completely. More than 89% of the respondents said that they prefer the suggestions from human doctor to take when diagnosis diverges. Moreover, only 25.34% of them believe in the therapeutic advice made by an artificial intelligence doctor independently. **Conclusion:** The present study showed that a high percentage of the public was not trust the use of artificial intelligence because they fear that artificial intelligence could cause fatal errors. Further studies are needed to ensure the efficacy of artificial intelligence doctor before the implementation and after that help patients in understanding the benefits and the risk of artificial intelligence use.

**Key words:** Artificial intelligence, attitude, clinical use, knowledge

## INTRODUCTION

After the end of the third industrial revolution around in the late 1970s with its continual influence up to the current day, we may be witnessing the fourth industrial revolution that is named artificial intelligence.<sup>[1]</sup> Artificial intelligence phrase was appeared in 1956 at a famous Dartmouth College conference,<sup>[2]</sup> and the earliest work in medical artificial intelligence dates back to the early 1970s and is also known as the artificial intelligence in medicine.<sup>[3]</sup>

Artificial intelligence is a branch of computer science concerned with the development of systems that can perform tasks that would usually require human intelligence, such as reasoning, problem-solving, and recognition.<sup>[4-7]</sup> It represents a collection of technologies; most of these technologies have immediate relevance to the health-care field and support different processes and tasks.<sup>[8]</sup>

Nowadays, there are several studies about the use of artificial intelligence in three key areas:

Machine-based learning to predict pharmaceutical properties of molecular compounds and targets for drug discovery,<sup>[9,10]</sup> using pattern recognition and segmentation techniques on medical images to enable faster diagnoses and tracking of disease progression<sup>[11,12]</sup> and generative algorithms for computational augmentation of existing clinical and imaging data sets<sup>[13]</sup> in addition to developing deep-learning techniques on multimodal data sources such as combining genomic and clinical data to detect new predictive models.<sup>[14,15]</sup>

Ramesh *et al.* stated that medical artificial intelligence applications have not only been used to support the diagnosis of several diseases but also the treatment protocol development,

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**Table 1: Demographic characteristics of the respondents**

Variable	Category	Number	Percentage
Gender	Male	76	17.19
	Female	366	82.81
Marital status	Married	198	44.8
	Not married	244	55.2
Education degree	Did not complete college	164	37.1
	Bachelor's degree	256	57.92
	Master's or doctor's degree	22	4.98
Occupation	Health related	208	47.06
	Computer science	10	2.26
	Others	224	50.68
Residence	City	404	91.4
	countryside or Badia	38	8.6
Total family income (SR)	≤5000	208	47.06
	<5000	234	52.94

patient monitoring, and drug development.<sup>[16]</sup> Turea reported that 91% of health-care decision-makers surveyed by Intel and Convergys Analytics recognized the benefits of artificial intelligence but 54% of them fear artificial intelligence will be responsible for a fatal error. There have been numerous cases where artificial intelligence has been less than perfect. Taken together, it would make sense why patients would want an opinion from a human expert over that of a machine – even when they're wrong.<sup>[17]</sup>

Regarding artificial intelligence in medicine, the feelings of patients are naturally neglected and it is not clear if the patients will accept it or not;<sup>[18]</sup> therefore, it is important to know their attitude toward using it in clinical practice. This study aims to explore the knowledge and attitudes of the public toward the clinical use of artificial intelligence.

## MATERIALS AND METHODS

This is a cross-sectional study that included an online questionnaire which was adapted from a previous study conducted by Yang *et al.*,<sup>[18]</sup> but in the present study, we included all of the public who are more than or equal to 18 years old. Hence, the exclusion criteria included males and females <18 years old. Moreover, the incomplete questionnaires were also excluded.

The questionnaire divided into three parts: Demographic characteristics of the respondents, knowledge regarding artificial intelligence in medicine, and patients' attitudes toward the clinical use of artificial intelligence.

The data were collected and analyzed using Excel software and after that there was represented as frequencies and percentages.

**Table 2: Knowledge regarding artificial intelligence in medicine**

Variable	Category	Number	Percentage
Have you heard of artificial intelligence in medicine	Yes	246	55.66
	No	196	44.34
You know about artificial intelligence in medicine	Completely	14	3.17
	Roughly	84	19
	Know little	94	22.27
	Only heard of it	86	20.38
	Never heard of it	164	37.1

## RESULTS

The survey was completed by 442 respondents. Most of them were female (82.81%) and not married (55.2%). More than half of the participants had a bachelor's degree and only 47.06% of them work in health-related occupations. The demographic characteristics of the respondents are shown in Table 1.

More than 55% of the respondents said that they had heard of artificial intelligence in medicine but only 3.17% said that they know about artificial intelligence in medicine completely and 57.48% of them do not know anything about artificial intelligence in medicine. Knowledge regarding artificial intelligence in medicine is shown in Table 2.

About 58.37% of the respondents said that they expect the presence of a human doctor in an artificial intelligence clinic and only 30.77% of them believe in the diagnosis made by an

**Table 3: Patients' attitudes toward the clinical use of artificial intelligence**

Variable	Category	Number	Percentage
Do you expect the presence of a human doctor in an artificial intelligence clinic?	Yes	258	58.37
	No	56	12.67
	Not matter	30	6.79
	Not sure	98	22.17
Do you believe in the diagnosis made by an artificial intelligence doctor independently	Yes	136	30.77
	No	306	69.23
Whose suggestion do you prefer to take when diagnosis diverges?	Artificial intelligence doctor	48	10.86
	Human doctor	394	89.14
Do you believe in the therapeutic advice made by an artificial intelligence doctor independently?	Yes	112	25.34
	No	330	74.66
Whose suggestion do you prefer to take when therapeutic advice diverges?	Artificial intelligence doctor	82	18.55
	Human doctor	360	81.45
To whom would you like to discuss the effect of the therapy or prognosis of the disease after the treatment?	Artificial intelligence doctor	48	10.86
	Human doctor	362	81.9
	Unwilling to receive follow-ups	32	7.24

artificial intelligence doctor independently. Patients' attitudes toward the clinical use of artificial intelligence are shown in Table 3.

## DISCUSSION

More than 89% of the respondents said that they prefer the suggestions from human doctor to take when diagnosis diverges not artificial intelligence doctor. Moreover, only 25.34% of them believe in the therapeutic advice made by an artificial intelligence doctor independently. About 81.45% of the respondents prefer the suggestion of human doctor to take when therapeutic advice diverges not artificial intelligence doctor. In addition, 81.90% said that they like to discuss the effect of the therapy or prognosis of the disease after the treatment with human doctor.

The study showed that a high percentage of the public did not have a good knowledge about artificial intelligence in medicine. Similarly, Yang *et al.* stated that 64.3% had never heard of artificial intelligence in medicine and that only 6.0% demonstrated that they were familiar with artificial intelligence in medicine to some extent.<sup>[18]</sup>

More than half of the respondents said that they expect the presence of a human doctor in an artificial intelligence clinic. Yang *et al.* stated that 86.8% of the patients in their study expect the presence of a human doctor in an artificial intelligence clinic.<sup>[18]</sup> This is rational because the patients still do not trust the use of artificial intelligence for their treatment. Turea reported that more than half of the health-care decision-makers fear artificial intelligence will be responsible for a fatal error and that the use of artificial intelligence could be less than perfect.<sup>[17]</sup>

Most of the respondents said that they prefer the suggestions from human doctor to take when diagnosis diverges or therapeutic advice diverges not artificial intelligence doctor. In addition, the majority of the respondents do not believe in the diagnosis or the therapeutic advice made by an artificial intelligence doctor independently. Similarly, Yang *et al.* stated that 88.8% of the patients prefer the suggestions from human doctor to take when diagnosis diverges not artificial intelligence doctor and that 91.3% of them prefer the suggestions from human doctor to take when therapeutic advice diverges not artificial intelligence doctor.<sup>[18]</sup>

Medical students felt that artificial intelligence would not be able to establish a definite diagnosis (56%) as reported by Dos Santos *et al.*<sup>[19]</sup> Ardon and Schmidt stated that laboratory employees see the potential for artificial intelligence and generally support the adoption of artificial intelligence tools but have concerns regarding job security and quality of artificial intelligence performance.<sup>[20]</sup> Furthermore, Sit *et al.* found that large proportion of medical students reported a lack of confidence and understanding required for the critical use of health-care artificial intelligence tools.<sup>[21]</sup> Tasdogan stated that only 2.9% of the anesthesiologists consider that artificial intelligence will completely replace physicians in the near future and that 5.9% of them are worried about developments in artificial intelligence.<sup>[22]</sup>

## CONCLUSION

The present study showed that a high percentage of the public was not trust the use of artificial intelligence and most of them prefer the diagnosis by human doctor not artificial intelligence doctor. The respondents fear that artificial intelligence could cause fatal errors. Further studies are needed to ensure

the efficacy of artificial intelligence doctor before the implementation and after that help patients in understanding the benefits and the risk of artificial intelligence use.

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