Journal of Artificial Intelligence for Medical Sciences
Vol. **2(1-2)**, 2021, *pp.* 76–84
DOI: https://doi.org/10.2991/jaims.d.210617.002; eISSN: 2666-1470
https://www.atlantis-press.com/journals/jaims/

Research Article

Exploring Medical Students' and Faculty's Perception on Artificial Intelligence and Robotics. A Questionnaire Survey

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ARTICLE INFO

Article History
Received 18 Jan 2021
Accepted 02 Jun 2021

Keywords
Artificial intelligence
Robotics
Medical students
Medical faculty
Medical education

ABSTRACT

Over the last decade, the emerging fields of artificial intelligence (AI) and robotics have been introduced in medicine, gaining much attention. This study aims to assess the insight of medical students and faculty regarding AI and robotics in medicine. A cross-sectional study was conducted among medical students and faculty of the University of Nicosia. An online questionnaire was used to evaluate medical students' and faculty's prior knowledge and perceptions toward AI and robotics. Data analysis was carried out using SPSS software, and the statistical significance was assumed as p value < 0.05. Three hundred eighty-seven medical students and 23 faculty responded to the questionnaire. Students who were "familiar" with AI and robotics stated that these breakthrough technologies make them more enthusiastic about working in their speciality of interest (p value = 0.012). Also, students (59.9%) and faculty (47.8%) agreed that physician's opinion should be followed when doctors' and AI's judgment differ and that the doctor in charge should be liable for possible AI's mistakes (38.8% students: 47.7% faculty). Although the most significant drawback of AI and robotics in healthcare is the dehumanization of medicine (54.5% students; 47.8% faculty), most participants (77.6% students; 78.2% faculty) agreed that medical schools should include in their curriculum AI and robotics by offering relevant courses (39.5% students; 52.2% faculty). Medical students and faculty are not anxious about the advancements of AI and robotics in medicine. Medical schools should take the lead and introduce AI and robotics in undergraduate medical curricula because the new era needs fully aware healthcare providers with better insight regarding these concepts.

1. INTRODUCTION

The breakthrough technology of artificial intelligence (AI) has been increasingly infiltrating into many aspects of people's everyday life since John McCarthy described the term in 1955 as "the science and engineering of making intelligent machines" [1]. Current advances in technologies such as computers and informatics make possible the utilization of AI and, in particular, deep learning systems in the field of medicine [2]. AI has been introduced dynamically in various specialties of medicine such as radiology and neurology [3–6], pathology [7–9], dermatology [10,11], ophthalmology [12,13], gastroenterology [14], cardiology [15], surgery [16] and molecular medicine and genetics [17,18].

Concurrently, advances in engineering lead to the introduction of robots in medicine. AI and medical robots work synergistically to improve surgical outcomes by enhancing precision, decreasing the possibility of human errors, and approaching each patient based on his/her unique profile [19]. Although the use of fully autonomous robots in the context of complex surgical interventions is not feasible yet [20], in 2016, Shademan *et al.* showed that the Smart Tissue Autonomous Robot (STAR), under experimental conditions, managed to complete a porcine intestinal anastomosis successfully, exceeding surgeons' performance [21].

The integration of AI and robotics in medicine will shape the future of healthcare; however, this dynamic incorporation has raised contradictory perspectives. Indeed, there is a belief that AI and robotics will be a valuable tool in healthcare, supporting physicians' role in diagnosis, planning, and intervention [22]. Recent research demonstrated that medical students agree that AI will improve medicine. In contrast, they disagree that AI will replace human physicians in the near future, with males being more confident and interested in AI than females [23]. On the other hand, there is a view that physicians will be marginalized by AI and fully autonomous robotic systems in several aspects of healthcare, giving rise to legal and ethical considerations [22]. Studies showed that medical students are discouraged from choosing certain specialities as a career due to the advancements in AI and are concerned about the replacement of various specialities by AI [24,25].

The pathways of current undergraduate medical students and AI and robotics will be intersected in the foreseeable future. Therefore, faculty in medical schools need to embrace these technological advancements to prepare students for the new era. There is no other study exploring both faculty's and medical students' attitude

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toward AI and robotics in medicine to the best of our knowledge. This study aims to narrow the existing gap in the literature by evaluating the perspectives of medical students and faculty regarding the importance of AI and robotics in medicine and their effect on the course of healthcare in the imminent future.

2. METHODS

2.1. Study Setting

A cross-sectional study was designed and carried out among (a) the students of the MBBS program (4-year duration), which is delivered in partnership by the St. George's University of London and the University of Nicosia at Nicosia, (b) the students of the MD program (6-year duration) of the University of Nicosia and (c) the faculty of the University of Nicosia Medical School. The participants were recruited between the October 5, 2020 and the October 17, 2020 via email invitations, which included the anonymous questionnaire link. Participation in this survey was voluntary, and it was ensured that all responses were anonymous. The sample size of this study included a total of 959 participants; 896 were medical students and 63 were faculty.

Ethical approval of this study was obtained by the Cyprus National Bioethics Committee (CNBC).

2.2. Questionnaire

A web-based questionnaire was developed utilizing Google Forms to assess the attitude of medical students and faculty toward the importance of AI and robotics in medicine and their potential outcomes in healthcare in the foreseeable future. The questionnaire (available on supplementary material) was designed based on recent references [23–26] and was evaluated by an AI expert to ensure the clarity and validity of the questions. More specifically, it was comprised of seventeen items collectively, and it was divided into two sections. The first section referred to the participants' demographic features and included three multiple-choice questions regarding participants' gender, age and status; a student of the MD program, a student of the MBBS program or a member of the university's faculty. The question concerning participants' status led to two sub-questions; depending on their choice, participants also had to select either the year of study (multiple-choice question) or fill in their field of expertise (open-ended question). The second section consisted of fourteen items; nine multiple-choice questions and five 5-point Likert scale items. The questions were about the following topics: familiarity with AI and robotics, the impact of AI and robotics in the present and the imminent future in healthcare, the legal and moral issues which could arise from this technology, the principal benefits and drawbacks resulting from the integration of AI and robotics in the medical field, and the integration of AI and robotics in the undergraduate medical curricula.

2.3. Data Analysis

The data were analyzed using the IBM SPSS software, V26 [27]. For statistical analysis, the categories "very familiar" and "familiar" were summarized as "familiar," and the categories "moderately familiar" and "slightly familiar" were summarized as "slightly/moderately familiar." The chi-squared test (two-sided) was utilized for binary or nominal variables, the nonparametric Mann–Whitney U test (two-sided) was used to compare categorical or continuous variables between two independent groups, and the nonparametric Kruskal–Wallis ANOVA test (two-sided) was utilized to compare categorical or continuous variables between three independent groups. The statistical significance level was set to p value < 0.05.

3. RESULTS

A total of 410 participants completed the questionnaire; 387 were medical students and 23 were faculty. Regarding the medical students, most of them (N = 302) belonged to the age group 18–24, and there were 146 males and 241 females. Out of the 23 faculty participants, 22 were aged above 35 years old, and there were 11 males and 12 females. The analytic demographic characteristics are shown in Table 1. Concerning the level of familiarity with AI and robotics in medicine, almost 2/3 (65.4%) of the students and more than 3/4 (82.6%) of the faculty responded that they are slightly/-moderately familiar with these concepts. A statistically significant difference (p value = 0.005) was noted only among the responses of the male and the female faculty participants where all the females characterized themselves as "slightly/moderately familiar," whereas 64% and 36% of the males considered themselves "slightly/moderately familiar" and "familiar," respectively. The vast majority of the students (62.8%) stated that AI and robotics had been dynamically integrated into medical practice nowadays. In contrast, a significant percentage (69.6%) of the faculty had the opposite opinion (p value = 0.002). Regarding the above statement, there is a statistically significant difference (p value = 0.003) between the responses of male and female students, with 68.5% of females supporting that AI and robotics have been dynamically integrated in medical practice today; in contrast, only 53.4% of male students shared the same opinion. There was no statistically significant difference in the responses of the participants when they were categorized as "familiar," "slightly/moderately familiar," and "not at all familiar" with AI and robotics in medicine.

Both students (43.4%) and faculty (69.6%) agreed that surgery has the most applications in AI and robotics nowadays, leaving in second place radiology. Regarding the future, both students (42.4%) and faculty (52.2%) believed that surgery would still be the field

Table 1 | Demographic characteristics of the participants.

	Students (%)	Faculty (%)	p–Value
Gender			
Male	146 (37.7)	11 (47.8)	0.333
Female	241 (62.3)	12 (52.2)	
Age group			
18–24	302 (78)	0 (0.0)	<0.001
24–34	80 (20.7)	1 (4.3%)	
35–44	3 (0.8)	10 (43.5%)	
45–54	2 (0.5)	5 (21.7%)	
54+	0 (0.0)	7 (30.4%)	

Table 2 Students'experience/beliefs regarding AI and robotics in medicine.

	1	2	3	4	5	Mean Likert Score (95% CI)	*p–Value* (Male vs. Female)	*p–Value* (Familiar vs. Slightly/Moderately Familiar vs. Not At All Familiar)
How familiar are you with artificial intelligence and robotics in medicine?[a]	79 (20.4%)	155 (40.1%)	98 (25.3%)	48 (12.4%)	7 (1.8%)	2.35 (2.25–2.45)	0.516	–
How will the advancements of artificial intelligence and robotics impact your decision of being involved in a specialty?[b]	12 (3.1%)	45 (11.6%)	184 (47.5%)	98 (25.3%)	48 (12.4%)	3.32 (3.23–3.42)	0.790	0.012
The diagnostic ability of artificial intelligence is superior to the diagnostic ability of a human doctor.[c]	51 (13.2%)	157 (40.6%)	96 (24.8%)	70 (18.1%)	13 (3.4%)	2.58 (2.48–2.68)	0.699	0.445
I would trust my medical care in artificial intelligence and robotics.[c]	65 (16.8%)	101 (26.1%)	154 (39.8%)	59 (15.2%)	8 (2.1%)	2.6 (2.50–2.70)	0.354	0.066
Medical schools should include in their curriculum artificial intelligence and robotics medical practice courses.[c]	2 (0.5%)	17 (4.4%)	68 (17.6%)	169 (43.7%)	131 (33.9%)	4.06 (3.97–4.15)	0.002	0.059

(a) 1: Not at all familiar; 2: Slightly familiar; 3: Moderately familiar; 4: Familiar; 5: Very familiar; (b) 1: Much less enthusiastic; 2: Less enthusiastic; 3: No impact; 4: More enthusiastic; 5: Much more enthusiastic; (c) 1: Strongly disagree; 2: Disagree; 3: Undecided; 4: Agree; 5: Strongly agree.

Table 3 Faculty's experience/beliefs regarding AI and robotics in medicine.

	1	2	3	4	5	Mean Likert Score (95% CI)	*p–Value* (Male vs. Female)	*p*–Value (Familiar vs. Slightly/Moderately Familiar vs. Not At All Familiar)	*p*–Value (Students vs. Faculty)
How familiar are you with artificial intelligence and robotics in medicine?[a]	–	15 (65.2%)	4 (17.4%)	3 (13%)	1 (4.3%)	2.57 (2.18–2.95)	0.005	–	0.360
How will the advancements of artificial intelligence and robotics impact your decision of being involved in a specialty?[b]	1 (4.3%)	1 (4.3%)	17 (73.9%)	3 (13%)	1 (4.3%)	3.09 (2.77–3.4)	0.380	0.528	0.210
The diagnostic ability of artificial intelligence is superior to the diagnostic ability of a human doctor.[c]	2 (8.7%)	12 (52.2%)	5 (21.7%)	4 (17.4%)	–	2.48 (2.09–2.87)	0.461	0.480	0.690
I would trust my medical care in artificial intelligence and robotics.[c]	2 (8.7%)	9 (39.1%)	8 (34.8%)	4 (17.4%)	–	2.61 (2.22–2.99)	0.454	0.466	0.994
Medical schools should include in their curriculum artificial intelligence and robotics medical practice courses.[c]	–	3 (13%)	2 (8.7%)	15 (65.2%)	3 (13%)	3.78 (3.41–4.15)	0.245	0.035	0.132

(a) 1: Not at all familiar; 2: Slightly familiar; 3: Moderately familiar; 4: Familiar; 5: Very familiar; (b) 1: Much less enthusiastic; 2: Less enthusiastic; 3: No impact; 4: More enthusiastic; 5: Much more enthusiastic; (c) 1: Strongly disagree; 2: Disagree; 3: Undecided; 4: Agree; 5: Strongly agree.

of medicine in which AI and robotics would be mostly implemented. There was no statistically significant difference in the participants' responses regarding their gender and their level of familiarity with AI and robotics for the above results. Near half of the students (47.5%) and the majority of faculty (73.9%) agreed that AI's and robotics' advancements would not impact their decision to be involved in a speciality of their interest (p value = 0.21). However, the "familiar" with the AI and robotics students stated that the advancements of AI and robotics in medicine make them more enthusiastic about working in their field of interest when compared to the "slightly/moderately familiar" and "not at all familiar," whom decision is not influenced (p value = 0.012). No other statistically significant difference was noted concerning gender.

Of all participants, a significant percentage of both students (87.3%) and faculty (91.3%) shared the opinion that AI and robotics would be integrated into medical care and supervised or operated by specialized personnel in the foreseeable future. However, there was a statistically significant difference between the responses of male and female students (p value = 0.027); nearly a double percentage of males believed that physicians would be replaced by AI and robotics (7.5% vs 3.7%) or that AI and robotics would have the same role in medical care as they have today (11% vs 5.4%). No other statistically significant difference was noticed regarding the participants' level of familiarity with AI and robotics.

In the case that physician's and AI's judgment differ, the majority of students (59.9%) and almost half of the faculty (47.8%) agreed that the physician's opinion should be followed, whereas 35.7% of students and 43.5% of faculty stated that this should be a patient's choice. Indeed, a significant percentage of the responders disagreed with the statements that the diagnostic ability of AI is superior to the diagnostic ability of a human doctor (53.8% of the students; 60.9% of the faculty) and that they would trust their medical care solely in AI and robotics (42.9% of the students; 47.8% of the faculty). Also, 38.8% and 32.8% of the students and 47.7% and 30.4% of the faculty agreed that the doctor in charge or the company created the AI should be liable for possible AI's mistakes, respectively. In none of these four cases was observed statistically significant difference regarding gender and participants' level of familiarity with AI and robotics.

Both students (60.5%) and faculty (73.9%) agreed that the main beneficial gain of integrating AI and robotics in modern medicine is the assistance for more precise surgical interventions. Also, students (54.5%) and faculty (47.8%) shared the opinion that the dehumanization of medicine is the most significant drawback of integrating AI and robotics in modern medicine. For both questions, statistically, significant differences were noted regarding gender (p value = 0.001; p value = 0.032), whereas no other statistically significant differences were observed.

More than 3/4 of students (77.6%) and faculty (78.2%) agreed that medical schools should include in their curriculum AI and robotics; a statistically significant difference was observed regarding students' gender (p value = 0.032). Most of the responders believed that the most critical initiatives to help students make an informed decision regarding the impact of AI and robotics are to invite experts

Table 4 | Participants' responses regarding the impact of AI and robotics in medicine nowadays.

	Students	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/-Moderately Familiar vs. not at all Familiar)	Faculty	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/Moderately Familiar vs. Not At All Familiar)	*p*–Value (Students vs. Faculty)
Have AI and robotics been dynamically integrated in medical practice nowadays?							
Yes	243 (62.8%)	0.003	0.140	7 (30.4%)	0.752	0.146	0.002
No	144 (37.2%)			16 (69.6%)			
In which of the following field of medicine have AI and robotics the most applications nowadays?							
Biopharmaceutical research and development	64 (16.5%)			2 (8.7%)			
Cardiology	28 (7.2%)			2 (8.7%)			
Dermatology	–			–			
Endocrinology	1 (0.3%)			–			
Histopathology	6 (1.6%)			–			
Internal medicine	8 (2.1%)	0.11	0.677		0.113	0.548	0.629
Nephrology	2 (0.5%)			–			
Neurology	24 (6.2%)			–			
Oncology	5 (1.3%)			–			
Ophthalmology	14 (3.6%)			–			
Radiology	67 (17.3%)			3 (13%)			
Surgery	168 (43.4%)			16 (69.6%)			

to provide lectures regarding the impact of AI (34.1% of students; 30.4% of faculty) and to offer courses on AI and robotics (39.5% of students; 52.2% of faculty). No statistically significant differences were noticed.

More information regarding the results is demonstrated in Tables 2–8.

4. DISCUSSION

The integration of AI and robotics in the medical field will influence the progress of medicine in general [22]. In this study, it is shown that although most of the medical students and faculty were slightly/moderately familiar with the concept of AI and robotics,

Table 5 Participants' responses regarding the impact of AI and robotics in future medicine.

	Students	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/-Moderately Familiar vs. Not At All Familiar)	Faculty	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/-Moderately Familiar vs. Not At All Familiar)	*p*–Value (Students vs. Faculty)
In your opinion, in the future:							
Physicians will be replaced by AI and robotics	20 (5.2%)			1 (4.3%)			
AI and robotics will be integrated into medical care and supervised/operated by specialized	338 (87.3%)	0.027	0.394	21 (91.3%)	0.303	0.794	0.835
AI and robotics will have the same role in medical care as they have today	29 (7.5%)			1 (4.3%)			
In which of the following field of medicine will AI and robotics have the most applications in the future?							
Biopharmaceutical research and development	48 (12.4%)			3 (13%)			
Cardiology	34 (8.8%)			2 (8.7%)			
Dermatology	7 (1.8%)			–			
Endocrinology	1 (0.3%)			–			
Histopathology	5 (1.3%)			–			
Internal medicine	22 (5.7%)	0.824	0.135	1 (4.3%)	0.157	0.14	0.997
Nephrology	1 (0.3%)			–			
Neurology	48 (12.4%)			2 (8.7%)			
Oncology	23 (5.9%)			1 (4.3%)			
Ophthalmology	7 (1.8%)			–			
Radiology	27 (7%)			2 (8.7%)			
Surgery	164 (42.4%)			12 (52.2%)			

Table 6 Participants' responses regarding the legal liability issues which could arise from AI and robotics.

	Students	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/Moderately Familiar vs. Not At All Familiar)	Faculty	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/-Moderately Familiar vs. Not At All Familiar)	*p*–Value (Students vs. Faculty)
If the physician's and the AI's judgments differ, which should be followed?							
Physician's opinion	232 (59.9%)			11 (47.8%)			
AI's opinion	17 (4.4%)	0.723	0.516	2 (8.7%)	0.977	0.461	0.412
Patient's choice	138 (35.7%)			10 (43.5%)			

Continued

Table 6 Participants' responses regarding the legal liability issues which could arise from AI and robotics. (*Continued*)

	Students	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/Moderately Familiar vs. Not At All Familiar)	Faculty	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/-Moderately Familiar vs. Not At All Familiar)	*p*–Value (Students vs. Faculty)
Who do you think will be liable for legal problems which might be caused by AI's mistakes?							
Doctor in charge of patient care	150 (38.8%)			11 (47.8%)			
Company that created the AI	127 (32.8%)			7 (30.4%)			
Patient who consented to follow AI's input	54 (14%)	0.341	0.523	1 (4.3%)	0.755	0.05	0.549
Independent AI agency	56 (14.4%)			4 (17.4%)			

Table 7 Participants' responses regarding the major benefits and drawbacks resulting from the integration of AI and robotics in the medical field.

	Students	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/Moderately Familiar vs. Not At All Familiar)	Faculty	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/-Moderately Familiar vs. Not At All Familiar)	*p*–Value (Students vs. Faculty)
What is the most beneficial gain of integration of AI and robotics in modern medicine?							
Assist physicians for more accurate diagnosis	105 (27.1%)			5 (21.7%)			
Assist surgeons for more precise surgical interventions	234 (60.5%)			17 (73.9%)			
Reduction of physician burnout	32 (8.3%)	0.001	0.833	-	0.12	0.307	0.427
Reduction of administration burden	16 (4.1%)			1 (4.3%)			
What is the most significant drawback of the integration of AI and robotics in modern medicine?							
Dehumanization of medicine	211 (54.5%)			11 (47.8%)			
Privacy violations of sensitive medical data	21 (5.4%)			-			
No standardized evaluation of the effect of artificial intelligence and robotics on healthcare	70 (18.1%)	0.032	0.764	7 (30.4%)	0.571	0.56	0.363
Lack of legal framework in case a physician accepts or rejects the recommendation of the algorithm.	85 (22%)			5 (21.7%)			

they were confident that in the foreseeable future, these technologies would not replace human physicians. Moreover, the students and the faculty would not hesitate to be involved in a speciality in which advancements in AI and robotics would be profound. Even though these findings are consistent with a recent study conducted in Germany [23], other studies demonstrated the opposite results. More specific, almost 50% of medical students in a UK study [25], 48% of medical students in a Canadian study [24] and 44% of medical students in a US study [26] stated that they were reluctant to choose radiology as a speciality because they were concerned that AI would sometime displace them. Interestingly, this study showed that the innovations of AI and robotics in medicine make students

Table 8 Participants' responses regarding the integration of AI and robotics in the undergraduate medical curricula.

	Students	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/Moderately Familiar vs. Not At All Familiar)	Faculty	*p*–Value (Male vs. Female)	*p*–Value (Familiar vs. Slightly/-Moderately Familiar vs. Not At All Familiar)	*p*–Value (Students vs. Faculty)
What is the most important initiative to help medical students make an informed decision regarding the impact of AI and robotics?							
Invite experts to provide lectures regarding the impact of AI	132 (34.1%)			7 (30.4%)			
Discuss AI advancements in preclinical radiology lectures	44 (11.4%)			1 (4.3%)			
Offer courses on AI and robotics	153 (39.5%)			12 (52.2%)			
Create radiology research projects involving AI	34 (8.8%)	0.239	0.086	-	0.712	0.241	0.427
Provide resources regarding AI	24 (6.2%)			3 (13%)			

who were familiar with this concept more enthusiastic about working in specialities that would integrate these advancements in the near future.

In general, males are considered to be more interested in AI and robotics. Indeed, in the European Union, only 54% of females had a favorable view toward AI compared to 67% of males [28]. This is also the case in the United States, where 30% of males and 44% of females were more suspicious towards newer technologies and characterized AI as an unsafe practice [29]. These results agree with Pintos de Santos *et al.* [23], who showed that males had a more positive attitude, confidence and interest regarding the benefits of AI in medical practice [23]. However, contrary to these results, our study showed that when a statistically significant difference was noted between gender, males were more concerned about the impact of AI and robotics in medicine.

In this study's cohort, a significant proportion of the students and the faculty believed that most applications of AI and robotics are and would be in the field of surgery and predicted that in the future, AI and robotics would be integrated into medical care and would be supervised/operated by specialized personnel. However, in a recent UK study nearly half of the students had the belief that AI would replace specific specialties in the future [25].

The integration of AI and robotics in healthcare will introduce legal liability issues [22]. This study demonstrated that all participants, whether they were students or faculty, believed that in case of AI's mistakes, the doctor in charge of patient care or the company, which created the AI, should be liable for legal issues. In the event that physician's and AI's judgment diverges, there were contradictory perspectives. Although most students and a significant part of the faculty reported that physician's opinion should be followed, there was a notable percentage of them who stated that this decision should be made by patients.

According to this survey's results, the main advantage of integrating AI and robotics in medical care is the aid that they offer to the surgeon for more accurate interventions. In contrast, the main disadvantage is the dehumanization of medicine. Also, nearly half of all responders in this survey would not trust their healthcare solely in AI and robotics, considering that AI's diagnostic ability is not superior to that of the human physician. Accordingly, Pinto dos Santos *et al.* [23] demonstrated that slightly more than 50% of the participants did not feel that AI could make a conclusive diagnosis from radiological examinations [23].

Although more than half of the students in this study reported that AI and robotics have already been dynamically incorporated in medicine, nearly 2/3 of the faculty indicated that this is not the case. Despite the controversial opinions between the students and the faculty, both groups agreed that AI and robotics should be introduced in medical curricula, either by lectures delivered by experts in the field or by offering a course in AI and robotics. Also, Sit *et al.* [24] showed that most of the students wanted to incorporate AI into the medical curriculum due to their belief that this would have a favorable effect on their future career [25]. The same research demonstrated that after 45 participants of the study's sample received some teaching in AI, felt more ready to cooperate with AI tools and were less likely to reject radiology as a carrier choice. However, they reported that they still have no confidence and the appropriate knowledge to use AI critically.

The primary strengths of this study are the large number of medical students who responded to the questionnaire and that there is no other study assessing medical students' and faculty's perspectives toward AI and robotics in medicine to the best of our knowledge. A limitation of this study is the low response rate regarding faculty (23/63), which may lead to the recruitment of a nonrepresentative sample. Thus, selection bias may be introduced, limiting our

ability to generalize our results to other medical schools. Also, "familiarity" was assessed, but this term may not indicate actual use of AI and robotics; therefore, some responses might have been biased depending on how the participants considered the term "familiarity." This study could be improved by investigating both students' and faculty's perspectives towards the impact of AI and robotics in medicine separately and after implementing several sessions in these fields. Multi-center studies need to be carried out in order for the external validity to be increased and evaluate the attitude of medical students and faculty toward AI and robotics in other medical curricula.

5. CONCLUSIONS

This study showed that although most students and faculty were slightly/moderately familiar with AI and robotics in medicine, they indicated that AI and robotics should be integrated into the medical curricula. Based on these results, proper actions should be followed, such as preparing faculty to deliver AI and robotics courses to ensure that students will be more confident and gain a better insight into these concepts. The ultimate goal is to shape future healthcare professionals to be thoroughly aware of AI and robotics in order to have a crucial role in the evolution and utilization of AI and robotics in modern medicine.

ETHICAL APPROVAL

Ethical approval of this study was obtained by the Cyprus National Bioethics Committee (CNBC).

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

Funding Statement

None.

ACKNOWLEDGMENTS

None.

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