Physician Opinions on Artificial Intelligence Chatbots in Dermatology: A National Online Cross-Sectional Survey of Dermatologists

Julian Cortes BS, Taraneh Paravar MD, Reid Oldenburg MD PhD

Department of Dermatology, University of California, San Diego Health, San Diego

ABSTRACT

Background: Artificial intelligence chatbots (AIC) have sharply risen in popularity. Dermatology, heavily involving visual, clinical, and pathological pattern-recognition techniques, will be impacted by AIC. Thus, this study aims to categorize the attitudes and beliefs of American dermatologists towards AIC and their potential uses, benefits, and risks.

Methods: An online cross-sectional survey was distributed to dermatologists across the United States. Questions explored opinions on AIC along with perceived benefits, risks, and important considerations for the incorporation of AIC into the practice of dermatology. Demographic data and self-reported understanding of AIC were also collected.

Results: 192 complete responses were received. 53.6% of respondents were female. 44.3% were between ages 30 to 39. 41.1% had 0 to 10 years of experience as attending physicians. 76.5% of participants believed it is somewhat or very likely that AIC will be formally incorporated into dermatology. Higher self-reported understanding of AIC was associated with an increased perceived likelihood of AIC implementation as well as decreased perceived risk associated with AIC. Notably, 86% of respondents believed AIC would impact "patient education," while concerns regarding "misinformation" and "incorrect diagnoses" were prevalent (89% and 78.5%, respectively). Participants anticipated AIC's role primarily in administrative tasks, with 75.7% citing "reduced work burden on physicians" as a potential benefit.

Conclusion: Dermatologists in the United States foresee the integration of AIC into their practice, emphasizing its potential in administrative roles. Concerns revolve around the complexity of medical understanding and effective patient communication. As AIC continues to evolve, ongoing studies are crucial to evaluate their safety and efficacy in dermatological practice.

J Drugs Dermatol. 2024;23(11):972-978. doi:10.36849/JDD.8239

INTRODUCTION

New artificial intelligence (AI) tools are being incorporated into the practice of medicine. Research has focused on AI's potential usage in disease diagnosis and patient care, treatment efficacy, and processing of large data.[1] One AI tool recently experiencing a sharp rise in use is the AI chatbot (AIC). The release of ChatGPT (Generative Pre-trained Transformer) by OpenAI in November 2022 was received with the fastest growing consumer base for an internet application, reaching 100 million users in two months.[2] Incorporating advanced language-learning technology, ChatGPT offers anyone with an internet connection the opportunity to receive a targeted response to virtually any prompt, including those related to medicine.

Dermatology, heavily involving visual, clinical, and pathological pattern-recognition techniques, will likely be impacted by AI. Currently, some AI tools have been developed to facilitate certain aspects of dermatological practice such as tracking nevus morphology and evolution, identifying concerning skin lesions, and even producing a differential diagnosis for a provided image.[3] Given the broad accessibility of AIC and their potential to process images, these tools may become highly relevant in the future of dermatology. However, with this possibility comes new concerns: how will AIC impact physicians, patients, or medical care delivery? To better understand the current role and future of AIC in dermatology, our study aimed to identify current opinions held by dermatologists. We deployed a survey designed to categorize the attitudes and beliefs of dermatologists towards AIC along with its potential uses, benefits, and risks for providers and patients.

MATERIALS AND METHODS

Study Population

This study employed an online cross-sectional survey distributed to dermatologists across the United States. Contacted groups included the Association of Professors of Dermatology, the American College of Mohs Surgery, the San Diego

J. Cortes, T. Paravar, R. Oldenburg

Dermatological Society, the Board-Certified Dermatologists Facebook group, and individual dermatologists. An exact response rate could not be calculated due to unknown total engagement across each contacted group. Participants were asked to confirm their status as board-certified dermatologists or dermatology residents and given informed consent prior to their participation. Given the deidentified nature of responses and the low risk associated with the subject matter, this study was given exemption approval by the University of California San Diego Institutional Review Board.

Survey

An anonymous, online survey of 19 questions was created through Qualtrics to assess medical providers' opinions on AI. Demographic data collected included age, sex, degree, stage of career, United States region, practice setting, and practice type. Questions assessed participants' opinions on AIC use, accuracy, and the likelihood of AIC future incorporation into the formal practice of dermatology, which was defined to include use by physicians or patients, integration into electronic medical records or clinic workflow, healthcare management by third parties, or other potential implementations. A further subset of questions asked participants to select all potential benefits, risks, and important considerations they believed to be associated with the implementation of AIC. Self-reported understanding of AIC was also assessed on a 5-point scale with a higher score indicating higher understanding.

Statistical Analysis

Frequencies and percentages were reported for categorical variables while means and standard errors were reported for continuous variables. Analysis of variance (ANOVA) and Chi-squared analysis were performed to assess differences between groups for continuous and categorical outcomes, respectively. Linear regression was performed to assess the impact of demographic variables on perceived risk associated with AIC incorporation into dermatology. Analyses were performed using SPSS 28.0 (IBM, Chicago, IL) and all tests were two-sided with an alpha level set at 0.05.

RESULTS

Demographics

A total of 214 responses were received with 192 complete responses selected for analysis. Demographic data are outlined in Table 1. 53.6% of respondents were female. The majority of respondents were between 30 and 39 years of age (44.3%) and had between 0-10 years of experience as attending physicians (41.1%). Most practiced either in academic centers or private practice institutions (43.8% and 37.5%, respectively) and resided in the Western US (43.2%).

Opinions on AICs

An aggregate of 64% of participants reported that they understand AIC 'not well at all,' 'slightly well,' or 'moderately well.' Most participants (71.9%) reported that they never utilize AIC in their medical practice, but an aggregate of 76.5% of participants believe that it is 'very likely' or 'somewhat likely' that AIC will be incorporated into the formal clinical practice of dermatology. Most participants (84.3%) believed that 0 to 20% of their patients use AIC to answer dermatology questions and that patient AIC usage was limited to 'monthly,' 'yearly,' or 'never.' A minority of 18.6% of participants believed that the information provided by AI chatbots was 'somewhat inaccurate' or 'worse,' (Table 2).

TABLE 1.

Demographics	
Demographic	**N (%) 192 total**
Sex	
Female	103 (53.6)
Male	86 (44.8)
Prefer not to say	3 (1.6)
Age	
18-29	7 (3.6)
30-39	85 (44.3)
40-49	47 (24.5)
50-59	30 (15.6)
60-69	17 (8.9)
70-79	6 (3.1)
Degree	
MD	158 (82.3)
MD/PhD	21 (10.9)
DO	13 (6.9)
Career Stage	
Residency	22 (11.5)
Fellowship	12 (6.3)
Junior attending (0-10 years' experience)	79 (41.1)
Mid-career attending (11-20 years' experience)	44 (22.9)
Advanced-career attending (21+ years' experience)	35 (18.2)
US Region	
West	83 (43.2)
Midwest	29 (15.1)
South	47 (24.5)
Northeast	33 (17.2)
Practice Setting	
Urban	188 (97.9)
Rural	4 (2.1)
Practice Type	
Academic center	84 (43.8)
Multispecialty medical groups	14 (7.3)
Private equity	21 (10.9)
Private practice	72 (37.5)
Retired	1 (0.5)

J. Cortes, T. Paravar, R. Oldenburg

TABLE 2.

Opinions on AI Chatbots	
Question	**Percent Response**
How well do you understand AI chatbots?	
Not well at all	28.1%
Slightly well	35.9%
Moderately well	25%
Very well	6.3%
Extremely well	4.7%
How often do you utilize AI chatbots in your medical practice?	
Daily	1.6%
Weekly	9.9%
Monthly	13.0%
Yearly	3.7%
Never	71.9%
What percentage of patients use AI chatbots to answer their dermatology questions?	
0-20%	84.3%
21-40%	13.6%
41-60%	1.6%
61-80%	0.5%
81-100%	0%
How often do you believe patients use AI chatbots to answer their dermatology questions?	
Daily	2.1%
Weekly	9.0%
Monthly	28.4%
Yearly	26.3%
Never	34.2%
How accurate is the information provided by AI chatbots?	
Completely inaccurate	0.5%
Mostly inaccurate	3.2%
Somewhat inaccurate	14.9%
Neutral	35.1%
Somewhat accurate	34.0%
Mostly accurate	12.2%
Completely accurate	0%
What is the likelihood that AI chatbots will be incorporated into the formal clinical practice of dermatology?	
Very unlikely	4.2%
Somewhat unlikely	7.8%
Neutral	11.5%
Somewhat likely	38.0%
Very likely	38.5%

ANOVA comparing groups within demographic categories discovered that higher self-reported understanding of AIC was significantly associated with an increased perceived likelihood of AIC implementation on a 5-point scale ($P<0.001$, Table 3a). Career stage, sex, and age were not associated with increased perceived likelihood of AIC implementation.

Risks, Benefits, and Important Considerations for AIC
Figure 1 summarizes participant opinions on which elements of dermatological practice would be impacted by the implementation of AIC. "Patient education" was the most selected at 86% while "administrative work," and "prior authorizations" were close behind (76.8% and 75.8% respectively). 54.7% of respondents believed "billing" would be impacted while only 36.8% believed "clinical decision-making" would be impacted. Through free text response, 3 responses identified "appointment triage" as an additional important factor.

When asked to select which factors should be considered for the future implementation of AIC in dermatology, 86.4% of respondents identified the "complexity of medicine", 83.2% identified the "availability of high-quality answers," and 80.1% identified "data privacy" as important elements (Figure 2). 69.1% of respondents thought the "level of autonomy for AIC" was also important while only 47.1% thought the "costs associated with AIC" should be considered. Four additional free-text responses identified "bias" as an important consideration and two additional responses highlighted the importance of the availability of "non-English responses."

Regarding potential pitfalls of AIC, most respondents selected "misinformation" or "incorrect diagnoses" (89% and 78.5%, respectively, Figure 3). 56.5% identified "dehumanization of healthcare" as a potential issue. Less than half of participants believed AIC would lead to "increased harm to patients" (40.3%), "reduction in physician's compensation" or "reduction in physician's skills" (34.6% and 28.3%, respectively), or "obsoletion of the role of healthcare providers in the workforce" (26.7%).

When asked about the potential benefits of AIC, 75.7% of respondents identified "reduced work burden on physicians" (Figure 4). 50.8% believed AIC would lead to "improved patient literacy" and "improved access to healthcare." Few respondents believed AIC would lead to "improved patient outcomes" or "improved physician-patient relationships" (23.8% and 11%, respectively). Six free text responses stated that no benefit would come from AIC use in dermatology.

Perceived risk associated with AIC implementation into dermatology was assessed on a 5-point scale with '5' indicating the highest risk. Participants on average believed AIC implementation would be associated with intermediate risk (3.32).
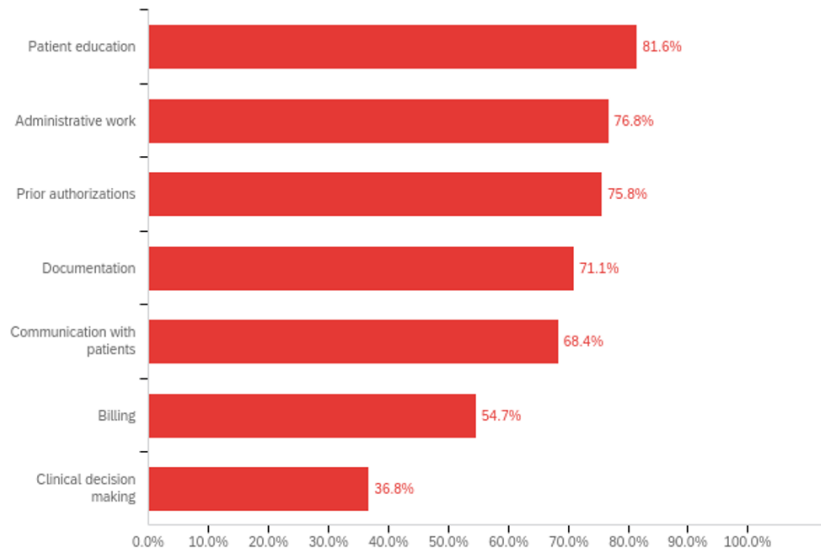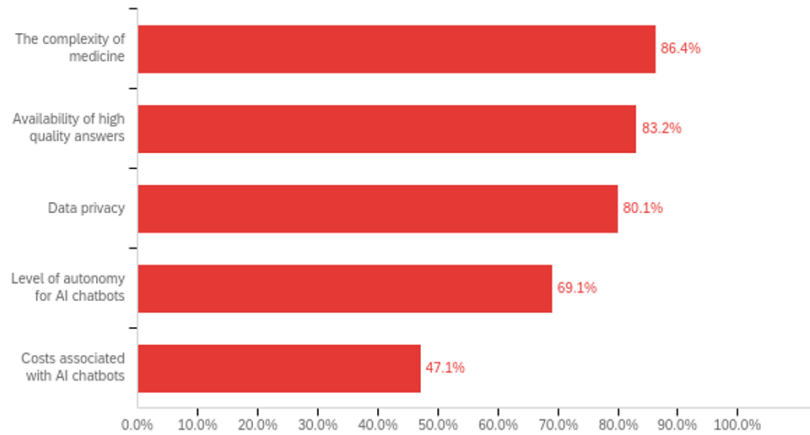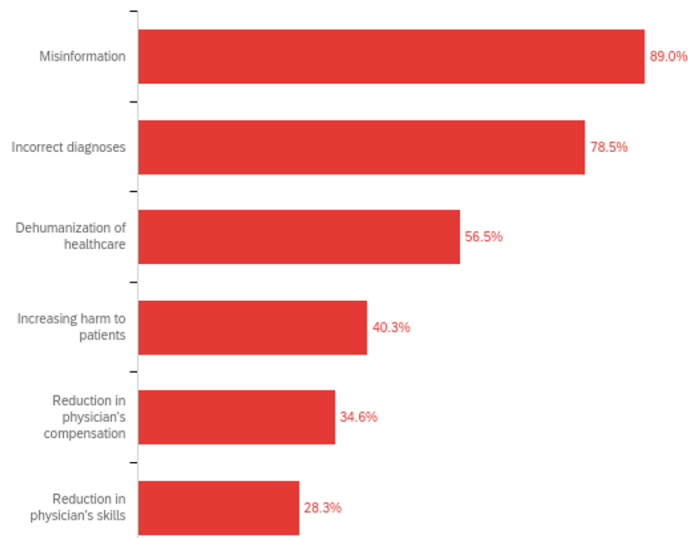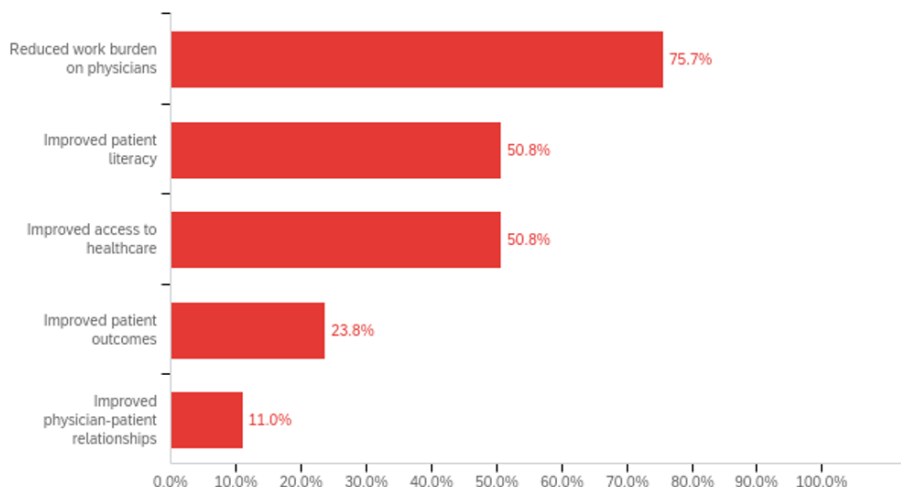
FIGURE 1. Which of the following elements of dermatologic practice will be impacted by AI chatbots?

FIGURE 2. Which of the following should be considered while implementing AI chatbots into dermatologic practice?

FIGURE 3. Which of the following issues will arise with the implementation of AI chatbots into dermatologic practice?

FIGURE 4. Which of the following benefits will arise with the implementation of AI chatbots into dermatologic practice?

ANOVA comparing groups within demographic categories discovered that older age, later career stage, and lower self-reported understanding of AIC were significantly associated with increased perceived risk (P=0.01, P=0.05, and P=0.05, respectively, Table 3b). Linear regression analysis using the same demographic variables found that older age (P=0.04) and lower self-reported understanding of AIC (P=0.05) remained significant predictors of increased perceived risk., while career stage was no longer statistically significant (P=0.95, Table 3c). Female sex was also significantly associated with higher perceived risk after linear regression analysis (P=0.03).

TABLE 3A.

ANOVA Comparing Belief in Future AI Chatbot Incorporation		
Variable	AI likelihood, mean (SE)	*P*-value
Age		
18-39	3.88 (0.13)	0.19
40-79	4.09 (0.10)	
Sex		
Female	3.93 (0.11)	0.78
Male	4.05 (0.12)	
Career stage		
Residency to junior attending	3.93 (0.11)	0.40
Mid-career to advanced-career attending	4.06 (0.11)	
Understanding of AI chatbots		
Not well to slightly well	3.78 (0.10)	<0.001***
Moderately to extremely well	4.35 (0.10)	

TABLE 3B.

Belief of Risk Associated with AI Chatbot Incorporation for Age, Sex, Career Stage, and Self-Reported AI Chatbot Understanding		
Variable	Risk, mean (SE)	*P*-value
Age		
18-39	3.14 (0.08)	0.01**
40-79	3.49 (0.09)	
Sex		
Female	3.45 (0.09)	0.08
Male	3.16 (0.09)	
Career stage		
Residency to junior attending	3.22 (0.07)	0.05*
Mid-career to advanced-career attending	3.47 (0.11)	
Understanding of AI chatbots		
Not well to slightly well	3.42 (0.07)	0.05*
Moderately to extremely well	3.16 (0.11)	

TABLE 3C.

Linear Regression Predicting Belief of Risk Associated with AI Chatbot Incorporation for Age, Sex, Career Stage, and Self-Reported AI Chatbot Understanding		
Variable	β	*P*-value
Age	0.24	0.04*
Sex	-0.16	0.03*
Career stage	-0.01	0.95
Understanding of AI chatbots	-0.14	0.05*

J. Cortes, T. Paravar, R. Oldenburg

DISCUSSION

To the best of our knowledge, this is the first study categorizing dermatologists' attitudes towards the use of AIC in dermatology and offers key insight into what dermatologists believe is important and concerning. Opinions will change over time as exposure to AIC increases, but understanding contemporary attitudes provides insight into the future role and implementation of AIC. Furthermore, current opinions highlight the value of continued education and research into this rapidly evolving field.

Most participants affirmed to not understand AIC well or use them at all in their practice, a result consistent with previous surveys assessing physician familiarity with AI.[4-8] Despite this, most participants believed that AIC would be integrated into the future practice of dermatology. This belief was shared by participants who had a higher self-reported understanding of AIC. Similarly, perceived risk associated with AIC was positively associated with older age and lower self-reported understanding of AIC, even after controlling for other demographic variables. A study by Polsie et al surveying 1271 dermatologists internationally revealed that physicians who had a strong familiarity with AI were more likely to express a positive attitude toward its use.[8] Although our study surveyed a smaller portion of physicians, our results indicate that there is a similar association between knowledge and approval of AIC for American dermatologists. As AIC continues to be developed, these results suggest that appropriate training in AIC and its use in the field will be critical for both current and future dermatologists to ensure their successful implementation and emphasize the appropriate risks and benefits that may be associated with their use.

In evaluating the potential downsides associated with AIC implementation, participants were most concerned about the ability of AIC to accurately process complex medical information and respond with relevant and vetted medical advice, especially if acting as an autonomous provider. AlZaabi et al found in a survey of 293 physicians and medical students in Gulf Cooperation Council countries that participants shared similar concerns about AI's ability to handle the complexity of medicine.[4] Nevertheless, most participants in our study were not concerned that AIC would cause increased harm to patients or a reduction in physician compensation and skills. Only a quarter of respondents believed AIC may lead to the obsoletion of healthcare providers. These results concur with previous studies finding that few physicians believe AI may one day replace them. Although AI and AIC may serve as useful tools within medicine, many physicians believe their capabilities will fall short of the proficiency of human physicians.[5,7-9] Indeed, the reliability of AIC acting in a physician-like capacity is unclear. One study by Lewandowski et al found that ChatGPT exceeded the 60% pass rate of 3 dermatology specialty certificate multiple-choice tests with a minimum of 80% correct.[10] However, another study by Stoneham et al found that ChatGPT was only able to offer a correct diagnosis on 56% of assessed questions, and only when given relevant clinical information by a dermatologist.[11] Future studies should aim to further assess the diagnostic capacity of AIC and its potential utilization by dermatologists. Finally, the most important consideration of AIC use in dermatology is safety when used in patient care. Although our survey addresses some concerns physicians may have with AIC, it does not provide direct data regarding safety. Thus, clinical studies that evaluate the effects of AIC on patient safety outcomes are required to ensure appropriate applications of AIC in patient care.

A limited number of dermatologists identified potential benefits with AIC implementation. The most identified benefit was a reduction in physician work burden. However, only half of respondents believed that AIC would improve patient literacy or access to healthcare. Even fewer believed AIC would lead to improved patient outcomes or physician-patient relationships despite 86% identifying "patient education" as an element of medicine likely to be impacted by AIC. A survey of 632 ophthalmologists, radiologists, and dermatologists in Australia and New Zealand by Scheetz et al found a similar result – physicians answered that AI will have a positive impact on workflow and professional duties but not much else.[12] Various additional perspective papers on AIC use have also identified the potential for AIC to streamline physician administrative burden.[13-15] These results may indicate that dermatologists view AIC as potentially useful administrative assistants but not as potential mediators between physicians and patients. Recent research may indicate this belief is somewhat well-founded – a study by Young et al found that various AIC produced responses lacked appropriate readability when asked questions about melanoma pathology.[16] A similar study by Mu et al produced similar results.[17] Although AIC can mediate communication between the medical community and the general population, future studies should aim to further analyze how physicians may appropriately use AIC in this capacity.

This study has limitations that should be considered when interpreting its results. Artificial intelligence is difficult to define, and it is possible that our participants had varying notions regarding the science of AI and AIC. Moreover, the utilization of an online cross-sectional survey and the potential factors influencing participants to respond may have led to selection bias in our cohort. Finally, our specific method of distribution did not allow for the calculation of an exact response rate, potentially limiting the generalizability of our findings.

CONCLUSION

This study has produced key insights into the beliefs dermatologists across the United States hold towards artificial intelligence chatbots. Most participants believed that AIC would eventually be incorporated into dermatology practice. Common

J. Cortes, T. Paravar, R. Oldenburg

concerns were related to the ability of AIC to understand the complexity of medicine well enough to produce high-quality medical advice in addition to its ability to communicate effectively with patients. Ultimately, participants viewed the future role of AIC as administrative assistants with the potential to impact patient education and access to care. Should AIC become incorporated into dermatologic practice, the results from this study highlight the importance of adequate training to ensure an appropriate understanding of the benefits and risks associated with AIC use.

DISCLOSURES

The authors have no conflicts of interest to disclose.

REFERENCES

1. Becker, A. Artificial intelligence in medicine: What is it doing for us today? *Health Policy Technol. 2*019;8(2):198-205.
2. Gordon, C. ChatGPT is the Fastest Growing App in the History of Web Applications. Forbes. Available at: www.forbes.com/sites/cindygordon/2023/02/02/chatgpt-is-the-fastest-growing-app-in-the-history-of-web-applications/?sh=3408bb40678c. Accessed December 21, 2023.
3. Rundle CW, Hollingsworth P, Dellavalle RP. Artificial intelligence in dermatology. *Clin Dermatol.* 2021;39(4):657-666.
4. AlZaabi A, AlMaskari S, AalAbdulsalam A. Are physicians and medical students ready for artificial intelligence applications in healthcare? *Digital Health.* 2023;9:20552076231152167.
5. Oh S, Kim JH, Choi SW, et al. Physician Confidence in Artificial Intelligence: An Online Mobile Survey. *J Med Internet Res.* 2019;21(3):e12422.
6. Chen M, Zhang B, Cai Z, et al. Acceptance of clinical artificial intelligence among physicians and medical students: a systematic review with cross-sectional survey. *Front Med.* 2022;9:990604.
7. Polesie S, McKee PH, Gardner JM, et al. Attitudes toward artificial intelligence within dermatopathology: an international online survey. *Front Med (Lausanne).* 2020;7:591952.
8. Polesie S, Gillstedt M, Kittler H, et al. Attitudes towards artificial intelligence within dermatology: an international online survey. *Br J Dermatol.* 2020;183(1):159-161.
9. Al-Ali F, Polesie S, Paoli J, et al. Attitudes towards artificial intelligence among dermatologists working in Saudi Arabia. *Dermatol Pract Concept.* 2023;13(1):e2023035.
10. Lewandowski M, Łukowicz P, Świetlik D, et al. An original study of ChatGPT-3.5 and ChatGPT-4 Dermatological Knowledge Level based on the Dermatology Specialty Certificate Examinations. *Clin Exp Dermatol.* 2024;49(7):686-691.
11. Stoneham S, Livesey A, Cooper H, et al. Chat GPT vs Clinician: challenging the diagnostic capabilities of A.I. in dermatology. *Clin Exp Dermatol.* 2024;49(7):707-710.
12. Scheetz J, Rothschild P, McGuinness M, et al. A survey of clinicians on the use of artificial intelligence in ophthalmology, dermatology, radiology and radiation oncology. *Sci Rep.* 2021;11(1):5193.
13. Zheng Y, Wang L, Feng B, et al. Innovating healthcare: The role of ChatGPT in streamlining hospital workflow in the future. *Ann Biomed Eng.* 2023. doi:10.1007/s10439-023-03323-w. Accessed December 21, 2023.
14. Patel SB, Lam K. ChatGPT: the future of discharge summaries? *Lancet Digit Health.* 2023;5(3):e107-e108.
15. Javaid M, Haleem A, Singh RP. ChatGPT for healthcare services: An emerging stage for an innovative perspective. *T Bench.* 2023;3(11).
16. Young JN, Ross O'Hagan, Poplausky D, et al. The utility of ChatGPT in generating patient-facing and clinical responses for melanoma. *J Am Acad Dermatol.* 2023;89(3):602-604. doi:10.1016/j.jaad.2023.05.024
17. Mu X, Lim B, Seth I, et al. Comparison of large language models in management advice for melanoma: Google's AI BARD, BingAI and ChatGPT. *Skin Health and Disease.* 2023. doi.org/10.1002/ski2.313.

AUTHOR CORRESPONDENCE

Julian Cortes BS

E-mail:................…............................ jcortes21311@gmail.com