Original Research Paper

A Novel Training Program on Ethics of Artificial Intelligence to Empower Educators and Students of Health Professions Education and Engineering Education – An Exigent Need of the AI-Driven World

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ABSTRACT

Background: Ethics of AI in healthcare involves ensuring the responsible use of artificial intelligence to safeguard patient privacy and prevent biases in medical decision-making, promoting equitable and ethical healthcare practices. This study presents the outcomes of a novel training program aimed at addressing the ethical implications of AI integration in healthcare. It brought together professionals from various disciplines to foster knowledge sharing and address concerns such as patient privacy, data anonymity, and informed consent.
Methodology: This novel training program included presentations, group discussions, and debates. A pre-test and post-test assessed the participants' knowledge, and an online survey evaluated session effectiveness.
Results: Statistical analysis indicated a significant improvement in participants' understanding of ethical concerns in AI in healthcare, with p-values < 0.0001. Feedback highlighted increased confidence in addressing these issues.
Conclusion: The training program successfully enhanced the knowledge and preparedness of healthcare professionals in navigating the ethical challenges of AI in healthcare, indicating the importance of multidisciplinary collaboration in this field.
Keywords: Artificial intelligence, Data, Ethics, Health Professions, Multidisciplinary, Technology.

Introduction

Artificial Intelligence (AI) has made remarkable strides in transforming the landscape of healthcare and technology [1]. From disease diagnosis to treatment planning and patient management, AI has demonstrated its potential to revolutionize clinical training and research. However, with this rapid advancement comes a myriad of ethical concerns that demand careful consideration [2]. The intersection of AI and healthcare presents both unprecedented opportunities and daunting challenges, making it essential for stakeholders to navigate the ethical frontiers of this technological frontier [3].

The integration of AI into healthcare has opened a new era of efficiency, accuracy, and accessibility. Machine learning algorithms can analyse vast amounts of medical data in seconds, aiding healthcare professionals in making faster and more informed decisions [4-5]. Diagnostic AI models can detect diseases at earlier stages, potentially saving lives, while predictive analytics can help in resource allocation and healthcare planning [6-7]. Moreover, AI-driven research accelerates drug discovery and personalized medicine, bringing us closer to tailored treatments for various medical conditions. These technological advancements are undoubtedly promising, but they also raise ethical concerns that need careful attention [8-9].

One of the primary ethical concerns surrounding AI in healthcare is patient privacy. As AI systems access and analyze patient data, ensuring the protection of sensitive medical information becomes paramount [10]. Another critical ethical consideration is the potential for AI to perpetuate biases present in historical healthcare data. If not properly addressed, AI systems can exacerbate disparities in healthcare outcomes, particularly affecting marginalized communities [11-12]. However, with these technological leaps come significant ethical considerations that need to be addressed. To bridge the gap between healthcare professionals and engineering professionals, a novel training program was conducted bringing together faculty members from diverse healthcare disciplines and engineering fields.

The training program aimed to foster a multidisciplinary dialogue that encourages collaboration and knowledge sharing among healthcare practitioners, educators, researchers, and engineers. By uniting these two seemingly distinct worlds, the goal was to explore the ethical frontiers of AI in healthcare, understand its implications, and work towards responsible and ethical AI integration in clinical training and research.

Methodology

Participants: The training program brought together 40 participants from a diverse group, including multidisciplinary healthcare professionals from Medicine, Dentistry, Ayurveda, Siddha, Unani, Homoeopathy, Nursing, Educators, Researchers, and Engineers. This multidisciplinary composition facilitated rich discussions and knowledge sharing.

Training Sessions: The training program followed a structured agenda, encompassing a range of themes and topics related to AI in healthcare ethics. The training featured multiple sessions, with expert speakers leading discussions and interactive activities. The methodology involved presentations, group discussions, and debate sessions, ensuring active participation and engagement.

Assessment: Prior to the training, participants underwent a pre-test consisting of 25 application-based questions to assess their baseline knowledge of AI in healthcare and its ethical dimensions. This pre-test included questions specifically focused on data anonymity and informed consent. After the training, a post-test was administered to measure the knowledge gained during the training period.

Evaluation: Each session's effectiveness and participants' confidence levels in addressing ethical concerns related to AI in healthcare were evaluated using structured online survey using validated questionnaire.

Statistical Analysis: The statistical package for social science (SPSS), version 17, created by SPSS Inc. USA for Microsoft Windows, was used to analyze all quantitative data. A significance threshold of $p < 0.05$ was applied. After determining the mean and standard deviation (SD) for each continuous variable, univariate statistics were used to perform a descriptive analysis. The T-test and Analysis of Variance (ANOVA) were then used to assess the differences between the mean

and SD. Both the Kruskal Wallis test and the Mann-Whitney U test were employed to look for differences in non-normal distributions.

Ethical Declarations: Ethical considerations were paramount throughout the training. Presenters and organizers adhered to ethical guidelines. Consent for data collection, assessment, and evaluation was obtained from all participants, and their anonymity was preserved.

Results

The results of the novel training program on the ethics of AI demonstrated a significant improvement in participants' knowledge regarding ethical concerns, particularly data anonymity and informed consent in the context of AI in healthcare. Statistical analysis of the pre-test and post-test results revealed a remarkable enhancement in participants' understanding, with p-values less than 0.0001, indicating highly significant changes. Furthermore, the evaluation reports provided overwhelmingly positive feedback. Participants expressed satisfaction with the training content and its ability to address complex ethical issues in AI-driven healthcare. The interactive sessions, including group discussions and debate sessions, were particularly well-received, allowing participants to actively engage with the material and their peers. The evaluation of the training is presented in Table 1.

Perhaps most notably, participants reported a substantial increase in their confidence levels concerning ethical concerns related to AI in healthcare. This newfound confidence was reflected in their ability to critically assess and address issues such as data anonymity and informed consent. The training effectively empowered participants to navigate the ethical challenges posed by AI, fostering a sense of competence and preparedness in the rapidly evolving field of healthcare technology. the increase in confidence level before and after the workshop is shown in Figures 1 and 2.

Table 1: Evaluation of Training Program

Evaluation Item	Strongly Agree (%)	Agree (%)	Neither Agree nor Disagree (%)	Disagree (%)	Strongly Disagree (%)
The session materials and discussions on AI ethics in healthcare were clear and understandable.	75	25	0	0	0
I actively participated in the discussions and activities during the session.	62.5	37.5	0	0	0
The session format, including group discussions and hands-on activities, promoted meaningful interaction among participants.	75	25	0	0	0
My understanding of AI ethics in healthcare improved because of this session.	66.7	29.2	4.1	0	0
The session influenced my attitudes / perceptions regarding the use of AI in healthcare positively.	79.2	20.8	0	0	0
I developed practical skills related to AI ethics in	50	45.8	4.2	0	0

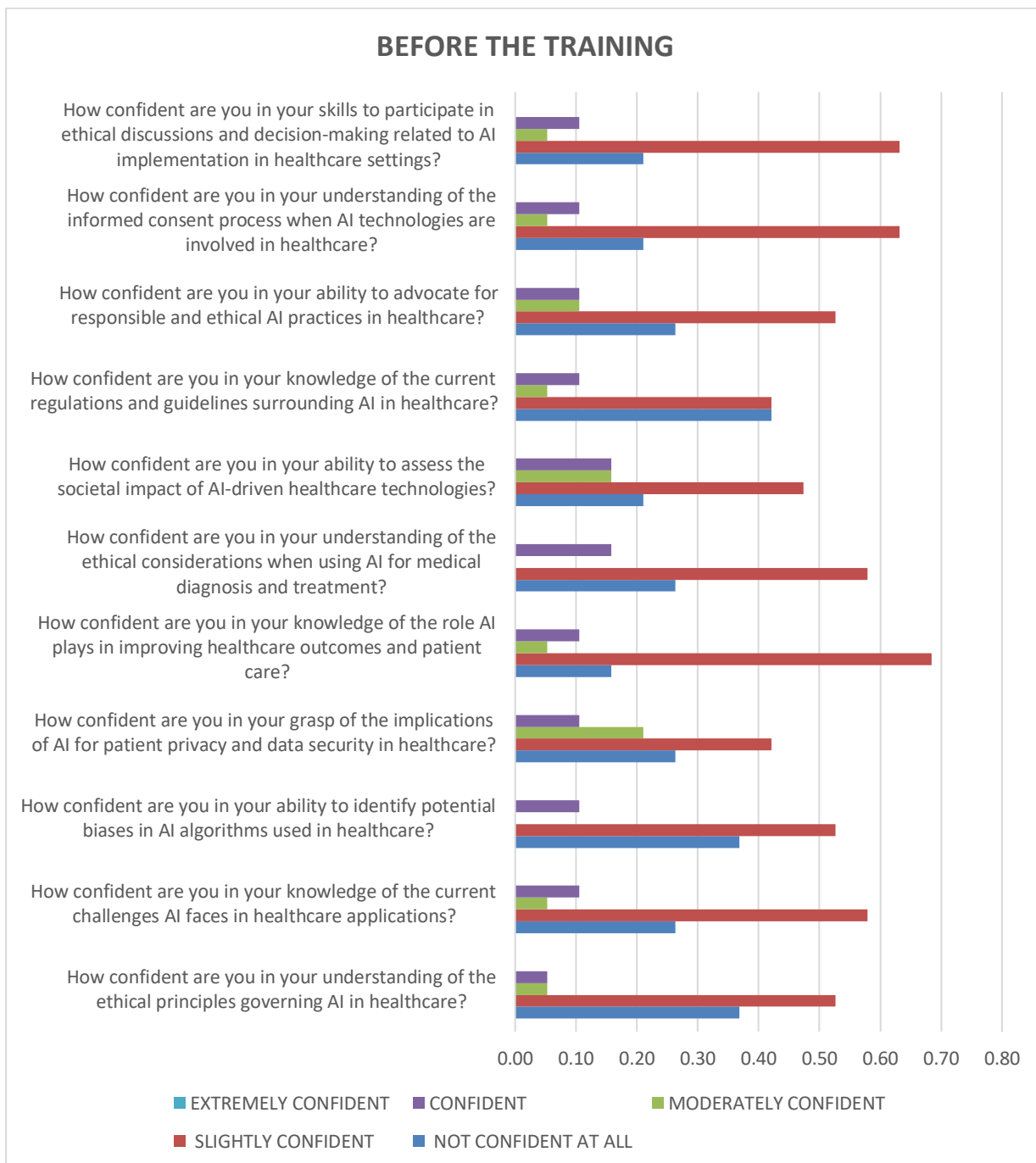|					
healthcare and decision making during the session.					
The session facilitator was qualified and demonstrated expertise in the field of AI ethics in healthcare.	70.8	29.2	0	0	0

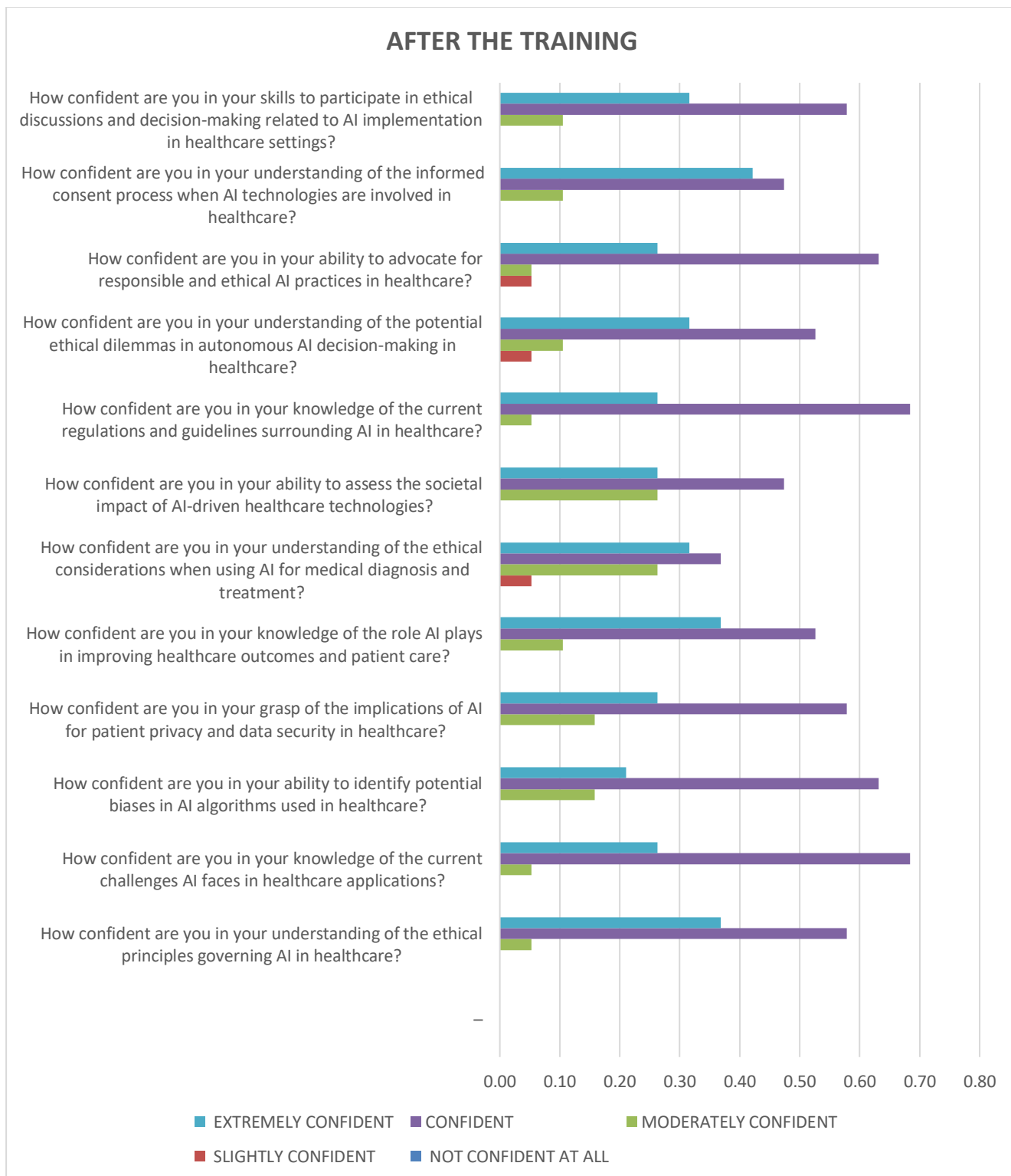**Figure 1: Confidence among participants before the training**

Figure 2: Confidence among participants after the training

Discussion

The success of the training program can largely be attributed to its comprehensive and multidisciplinary approach. By addressing the intersection of AI and healthcare ethics from various angles, the training provided attendees with a well-rounded understanding of the complex issues at hand. One key takeaway was the emphasis on the paramount importance of maintaining patient privacy in the era of data-driven healthcare [13]. With AI playing an increasingly

significant role in healthcare, it is crucial to ensure that patients' sensitive information remains secure and confidential [14]. Additionally, the training shed light on the potential risks associated with AI, such as perpetuating biases in medical decision-making. Participants recognized the need for rigorous ethical guidelines and oversight to prevent AI algorithms from inadvertently reinforcing existing disparities in healthcare. Moreover, the training underscored the urgency of integrating ethical considerations into AI implementations in clinical settings, emphasizing the importance of responsible AI deployment that prioritizes patient well-being.

The interactive format of the training program played a pivotal role in its success. By encouraging active participation and open discussions, it fostered a deeper understanding of the intricate ethical dilemmas posed by AI in healthcare. Attendees were able to engage with experts and peers, share their insights, and collectively grapple with these complex issues. This interactive approach allowed participants to explore real-world case studies and scenarios, enabling them to apply ethical principles to practical situations. Overall, the training not only provided a platform for knowledge exchange but also empowered attendees with the tools and insights necessary to navigate the ethical challenges inherent in the integration of AI into healthcare which is crucial for healthcare providers and technologists [15]. Thus, the training program's success can be attributed to its holistic approach, emphasizing patient privacy, addressing biases, and advocating for ethical AI integration, combined with its interactive format that facilitated meaningful engagement and understanding among participants.

Conclusion

The training program significantly advanced the knowledge and confidence of healthcare professionals in addressing the ethical challenges posed by AI in healthcare. It underscored the critical role of multidisciplinary collaboration and continuous education in ensuring the responsible and ethical application of AI in clinical settings, ultimately contributing to improved patient care and health outcomes.

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