SHORT COMMUNICATION

Will healthcare workers incorporate artificial intelligence in their practices

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Abstract

Artificial intelligence can potentially ensure high-quality health care delivery in many ways. An observational study was conducted at a tertiary care university hospital to assess the perception of preparedness and professional impact of artificial intelligence among medical and nursing students and healthcare professionals. The "Shinners Artificial Intelligence Perception tool" was used. Responses from 345 respondents were included. The number of respondents between the ages of 18-30 years was 305 (88.4%), while 202 (58.6%) of them were female. The mean score for "professional impact of AI" was highest amongst medical students (3.98 ± 0.58) and lowest amongst medical doctors (3.52±0.66). The mean score for "preparedness of AI" was highest amongst nursing professionals (3.28±1.13), while it was lowest amongst nursing students (2.29±0.98). Future interventions to train healthcare workers for utilisation of AI should take these differences into account.

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Introduction

Artificial Intelligence (AI) is a general term implying the use of computers to model intelligent behaviour with minimal human intervention.[1] AI has made significant progress in the field of medicine in recent years, with applications in various domains including diagnosis, treatment, and education.[2]

From reading medical images to identifying outbreaks of infectious diseases and identifying conditions that might otherwise have escaped detection, AI has the potential to enhance medicine in many ways.[3] Results from a recent survey in Pakistan suggest insufficient training about AI in healthcare with more than three-fourth of the participants not having received any formal training during their studies/employment.[4]

This study was conducted to assess the perception of preparedness and professional impact of AI among medical and nursing students, medical doctors, and registered nurses at a tertiary care hospital in Pakistan.

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Methods, Results, and Discussion

An observational cross-sectional study was conducted among medical and nursing students, medical doctors, and registered nurses at The Aga Khan University Hospital situated in Karachi, Pakistan, from November 2023 – August 2024. After obtaining permission from the corresponding author, a validated questionnaire, i.e. the "Shinners Artificial Intelligence Perception tool" was used.[5] This tool consists of ten questions to assess the perception of AI using a five-point Likert scale (where 1 means totally disagree and 5 means totally agree). Online and paper-based versions of the questionnaire were used. Informed consent was obtained from all individuals participating in the survey. Approval was obtained from the Ethical Review Committee (ERC) of the university hospital (ERC reference number: 2023-8832-25944). Data collected also included basic demographic information of the participants including age group, gender, years of experience for medical and nursing professionals, and year of study for medical and nursing students.

A sample size of 326 participants was calculated using OpenEpi software[6] keeping an anticipated willingness of 30.5%[7] and a 95% level of confidence. Convenience sampling technique was employed. The inclusion criteria consisted of medical and nursing students, medical doctors, and registered nurses. Participants who did not give consent to participate in the study or who were not ≥ 18 years of age were excluded.

Data was analysed using IBM SPSS version 23.0. Frequencies and percentages were calculated for age group, gender, profession, and year of study for medical and nursing students. Median [inter-quartile range] is reported for years of experience for medical and nursing professionals. The methodology of Catalina et al. was followed, who, using factor analysis, obtained two dimensions across the SHAIP questionnaire items; "professional impact of AI" as the mean (±standard deviation) of the individual scores of questions 1 to 6, and "preparedness of AI" as the mean (±standard deviation) of the individual scores of questions 7 to 10.[8] Cronbach's alpha was used to determine the validity and reliability of two

dimensions. In general, Cronbach's alpha of 0.7 is taken as indication of good internal consistency. Analysis of variance test was applied to assess the differences among the mean Likert score out of 5 for each question with profession (medical doctor, medical student, nursing professional, and nursing student). All p-values were based on two-sided tests and significance was set at a $p< 0.05$.

A total of 382 responses were obtained. After the exclusion of responses with missing data, 345 (90.3%) respondents were included in the final analysis. The number of respondents between the ages of 18-30 years was 305 (88.4%), while 202 (58.6%) were females. Most, i.e. 149 (43.2%), were medical doctors, while the number of medical students, nursing professionals, and nursing students were 54 (15.7%), 66 (19.1%), and 76 (22.0%), respectively. Medical doctors had a median 2 [1-5] years of experience, while nursing professionals had a median 4 [2-8] years of experience. The number of medical and nursing students who were in year 3 or above was 25 (46.3%) and 60 (78.9%), respectively.

The Cronbach's alpha estimation of internal consistency and reliability of two dimensions was 0.749 (95% confidence interval 0.706-0.788) and 0.776 (95% confidence interval 0.734-0.812) for "professional impact of AI" and "preparedness of AI", respectively.

The mean score for "professional impact of AI" was 3.72±0.67 out of 5 on the Likert scale. The mean score was highest (3.97±0.88) for the item "I believe that the use of AI in my speciality could improve the delivery of patient care", while it was lowest (3.33±1.30) for "I believe that one day AI may take over part of my role as a healthcare professional", The mean score was 2.77±0.95 for "preparedness of AI". The mean score was highest (2.99±1.31) for the item "I believe that should AI technology make an error, full responsibility lies with the healthcare professional," while it was lowest (2.55±1.22) for the item "I believe that I have been adequately trained to use AI that is specific to my role."

On stratifying responses based on profession, the mean score for the "professional impact of AI" was highest, i.e. 3.98±0.58, amongst medical students and lowest, i.e. 3.52±0.66, amongst medical doctors. The mean score for "preparedness of AI" was highest, i.e. 3.28±1.13, amongst nursing professionals, while lowest, i.e. 2.29±0.98, amongst nursing students. Responses stratified by profession are presented in Table.

The results indicate that although the participants agreed that AI could have a positive professional impact by improving patient care and clinical decision making, they were unsure if they were prepared or adequately trained. Similar to our results, Catalina et al. observed mean scores

Table: Responses from the Shinners Artificial Intelligence Perception Tool scored on a 5-point Likert scale stratified by profession.

Question	Total (n = 345) Mean±SD	Medical Doctors (n = 149) Mean±SD	Medical Students (n = 54) Mean±SD	Nursing Professionals (n = 66) Mean±SD	Nursing Students (n = 76) Mean±SD	*p*- value
Professional Impact of AI	3.72 ± 0.67	3.52 ± 0.66	3.98 ± 0.58	3.90 ± 0.72	3.74 ± 0.57	< 0.001
1 **I believe that the use of AI in my specialty could improve the delivery of patient care**	3.97 ± 0.88	3.76 ± 0.82	4.13 ± 0.87	4.09 ± 0.89	4.18 ± 0.90	0.001
2 **I believe that the use of AI in my speciality could improve clinical decision making**	3.85 ± 0.96	3.60 ± 0.92	4.13 ± 0.83	3.94 ± 1.01	4.04 ± 0.99	< 0.001
3 **I believe that AI can improve population health outcomes**	3.91 ± 0.85	3.70 ± 0.87	4.13 ± 0.67	4.05 ± 0.90	4.04 ± 0.81	0.001
4 **I believe that AI will change my role as a healthcare professional in the future**	3.83 ± 1.00	3.71 ± 0.95	4.09 ± 0.87	3.86 ± 1.01	3.86 ± 0.93	0.087
5 **I believe that the introduction of AI will reduce financial cost associated with my role**	3.40 ± 1.01	3.17 ± 1.00	3.57 ± 1.13	3.65 ± 0.92	3.51 ± 0.93	0.002
6 **I believe that one day AI may take over part of my role as a healthcare professional**	3.33 ± 1.30	3.19 ± 1.30	3.83 ± 1.27	3.83 ± 1.26	2.83 ± 1.09	< 0.001
Preparedness of AI	2.77 ± 0.95	2.81 ± 0.77	2.74 ± 0.80	3.28 ± 1.13	2.29 ± 0.98	< 0.001
7 **I believe that overall, healthcare professionals are prepared for the introduction of AI technology**	2.77 ± 1.17	2.72 ± 1.03	2.63 ± 1.20	3.20 ± 1.24	2.59 ± 1.27	0.008
8 **I believe that I have been adequately trained to use AI that is specific to my role.**	2.55 ± 1.22	2.56 ± 1.12	2.43 ± 1.06	3.27 ± 1.35	2.00 ± 1.14	< 0.001
9 **I believe there is an ethical framework in place for the use of AI technology in my workplace**	2.79 ± 1.21	2.92 ± 1.00	2.65 ± 1.28	3.29 ± 1.24	2.20 ± 1.31	< 0.001
10 **I believe that should AI technology make an error; full responsibility lies with the healthcare professional**	2.99 ± 1.31	3.04 ± 1.27	3.26 ± 1.22	3.35 ± 1.31	2.38 ± 1.25	< 0.001

of 3.62 and 2.76 for "professional impact of AI" and "preparedness of AI", respectively.[8] Limitations of the present study include a relatively small sample size and single centre design.

Conclusion

Perception of "preparedness of AI" and "professional impact of AI" is variable amongst medical and nursing students and professionals. Future interventions to train healthcare workers for utilisation of AI should take these differences into account.

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Conflicts of Interest: None.

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Author Contribution:

HJ: Concept, project administration, formal analysis and preparation of original draft.
II & MY: Data collection and preparation of original draft.
EA: Concept, proposal writing and literature search.
IK: Concept, proposal writing, interpretation of results, review and editing.
AA: Concept, methodology, review and editing.