

Consent Page

Agreement: Continuing to the next page (where you will begin the survey) indicates that you have read the information below, have had a chance to ask any questions you have about the study, and consent to participate in this study.

*Title of the study: **Knowledge and perception of artificial intelligence among undergraduate students of medical, pharmaceutical and Allied health sciences at Riphah International University.***

Participation: If you wish to participate in this study, please complete the survey. The survey should take you approximately 5-10 minutes to complete.

Purpose of the Study: From this research, we wish to assess medical students' understanding of AI, and their perceptions of how AI will impact the healthcare field and what limitations we can face in the practical implementation of artificial intelligence in the field of healthcare. The results will inform our understanding of what existing gaps and opportunities there are for medical education to prepare future physicians for AI-integrated healthcare environments.

Benefits: There are no direct personal benefits to you.

Risks: There are no foreseeable risks.

Compensation: No compensation is provided.

Confidentiality and Anonymity: Your survey answers will be collected through Google Forms, after which the data will be stored in a password-protected electronic format. Google Forms does not collect identifying information; therefore, your responses will remain anonymous.

The information that you will share will remain strictly confidential and will be used solely for research purposes. The only people who will have access to the research data are the investigators. Your answers to open-ended questions may be used verbatim in presentations and publications but you will not be identified. Results will be published in pooled (aggregate) format.

Voluntary Participation: You are under no obligation to participate and if you choose to participate, you may withdraw at any time by closing your browser or by declining the answer to question(s) without any negative consequences.

I have read the instructions and I give my consent to participate in this study.

- a. YES
- b. NO

Section 1: Demographic and Background Information

1. What is your gender?

- a. Female
- b. Male

2. What is your department of study?

- a. MBBS (Bachelor of Medicine, Bachelor of Surgery)
- b. BDS (Bachelor of Dental Surgery)
- c. DPT (Doctor of Physical Therapy)
- d. Nursing
- e. Pharmacy
- f. Other (mention)

3. What is your year/semester of Study?

4. Have you undertaken any training where artificial intelligence, machine learning, or deep learning was taught/discussed (e.g. certificate program, online course, etc)?

g. Yes

Please describe the training, including the duration of the course(s):

h. No

5. Have you attended or viewed any talks or lectures on artificial intelligence?

i. Yes

i. Approximately how many? _____

j. No

Section 2: Knowledge of Artificial Intelligence

To what extent do you agree with the following statements? tick one box in each row

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
I understand what the term “artificial intelligence” means.					
I understand what the term “machine learning” means.					
I understand what the term “neural network” means.					
I understand what the term “deep learning” means.					
I know what an algorithm is in the context of computer science.					

Section 3: Perceptions of Artificial Intelligence

Please read this definition: Artificial Intelligence is the theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, and decision-making.

In your opinion, **what is the likelihood that artificial intelligence-enabled technologies will ever be able to replace human beings in performing these tasks** as well as or better than the average doctor?

Individual Patient Care (tick one box in each row)

	extremely unlikely	unlikely	uncertain	likely	extremely likely
Provide patients with preventative health recommendations (e.g., exercise, diet, wellness).					
Analyze patient information to reach diagnoses.					
Analyze patient information to establish prognoses.					
Read and interpret diagnostic imaging.					
Evaluate when to refer patients to other health professionals.					
Formulate personalized treatment plans for patients.					
Formulate personalized medication prescriptions for patients.					
Provide empathetic care to patients.					
Monitor patient compliance to prescribed medications, exercise, and dietary recommendations.					
Provide psychiatric/personal counseling.					
Perform surgery (e.g., robotic surgery).					

If answered Likely or Extremely likely: When, in your estimation, will technology have the capacity to replace the average healthcare professional in performing this task? (*tick one box in each row*)

	0-4 years	5 to 10 years from now	11 to 25 years from now	26-50 years	more than 50 years from now
Provide patients with preventative health recommendations (e.g., exercise, diet, wellness).					
Analyze patient information to reach diagnoses.					
Analyze patient information to establish prognoses.					
Read and interpret diagnostic imaging.					
Evaluate when to refer patients to other health professionals.					
Formulate personalized treatment plans for patients.					
Formulate personalized medication prescriptions for patients.					
Provide empathetic care to patients.					
Monitor patient compliance to prescribed medications, exercise, and dietary recommendations.					
Provide psychiatric/personal counseling.					
Perform surgery (e.g., robotic surgery).					

Health Systems(tick one box in each row)

	extremely unlikely	unlikely	uncertain	likely	extremely likely
Provide documentation (e.g., update medical records) about patients.					
Assist hospitals in capacity planning and human resource management.					
Provide recommendations for quality improvement in practices/hospitals.					

If answered Likely or Extremely likely: When, in your estimation, will technology have the capacity to replace the average healthcare professional in performing this task?

	0-4 years	5 to 10 years from now	11 to 25 years from now	26-50 years	more than 50 years from now
Provide documentation (e.g., update medical records) about patients.					
Assist hospitals in capacity planning and human resource management.					
Provide recommendations for quality improvement in practices/hospitals.					

Population Health (tick one box in each row)

	extremely unlikely	unlikely	uncertain	likely	extremely likely
Conduct population health surveillance and outbreak prevention.					
Select the best population health interventions.					

If answered Likely or Extremely likely: When, in your estimation, will technology have the capacity to replace the average healthcare professional in performing this task? (*tick one box in each row*)

	0-4 years	5 to 10 years from now	11 to 25 years from now	26-50 years	more than 50 years from now
Conduct population health surveillance and outbreak prevention.					
Select the best population health interventions.					

Impact on the Medical Profession (*tick one box in each row*)

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
I perceive AI in medicine as a partner rather than a competitor.					
Artificial Intelligence will reduce the number of jobs available to me.					
Artificial Intelligence will reduce the number of jobs in certain medical specialties more than others.					
Artificial Intelligence will already/ did impact my choice of specialty selection.					

Section 4: Limitations:

In your opinion, what limitations or challenges can we face to introduce AI into our healthcare system?

AI Ethics (tick one box in each row)

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
AI in medicine will raise new ethical challenges.					
AI in medicine will raise new social challenges.					
AI in medicine will raise new challenges around health equity.					

AI and developing country (tick one box in each row)

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
The Pakistanis healthcare system is currently well prepared to deal with challenges having to do with AI.					
Implementation of artificial intelligence in health care system would be a great challenge because of the limited resources in our country, Pakistan.					

Section 5: Opinions about Artificial intelligence

1. Artificial Intelligence should be introduced in the integrated curriculum of medical degrees.
 - a) YES
 - b) NO
2. Learning the relevant topics of AI in medicine will significantly detract me from my undergraduate curriculum.
 - a) YES
 - b) NO
3. Medical training should include training on AI competencies (e.g. what is AI, how will it impact us, what are the challenges it raises).
 - a) YES
 - b) NO
4. Every medical trainee should be required to receive training in AI competencies.
 - a) YES
 - b) NO
5. Training in AI competencies should begin as a:
 - c) Student
 - d) Postgraduate
 - e) Practicing healthcare professionals
 - f) No training in AI competencies is necessary
6. Which sector of health care do you think will be the first to commercialize artificial intelligence?
 - g) Public primary care such as public health centers.
 - h) Primary care in private clinics.
 - i) Specialized clinics.
 - j) University hospitals.

Thank you for completing the questionnaire!