

Supplementary Table 1. The impact of excluding individual institutions on consensus outcomes in the Delphi process. This presents the variations in the inclusion, exclusion, and undecided percentages of curricular elements when each institution is individually removed from the analysis, highlighting the influence of specific institutions on the overall consensus.

Round 1

Institution Removed	% Included	% Excluded	% Undecided
None	58.9	0	41.1
University of British Columbia	39.3	0	60.7
Simon Fraser University	59.3	0	40.7
Dalhousie University	57	0	43
Memorial University of Newfoundland	63.6	0	36.4
University of Calgary	62.6	0	37.4
University of Alberta	58.9	0	41.1
University of Toronto	55.1	0	44.9
Queen's University	61.7	0	38.3
University of Western Ontario	58.9	0	41.1

Round 2

Institution Removed	% Included	% Excluded	% Undecided
None	29.5	27.3	43.2
University of British Columbia	27.3	34.1	38.6
Simon Fraser University	29.5	27.3	43.2
Dalhousie University	29.5	40.9	29.5
Memorial University of Newfoundland	29.5	27.3	43.2
University of Alberta	29.5	27.3	43.2
University of Toronto	29.5	27.3	43.2
Queen's University	29.5	29.5	40.9
University of Western Ontario	29.5	34.1	36.4

Round 3

Institution Removed	% Included	% Excluded	% Undecided
None	31.6	5.3	63.2
University of British Columbia	26.3	5.3	68.4
Simon Fraser University	31.6	10.5	58.9
Dalhousie University	31.6	5.3	63.2
Memorial University of Newfoundland	36.8	5.3	57.9
University of Alberta	42.1	10.5	47.4
University of Toronto	47.4	5.3	47.4
Queen's University	31.6	5.3	63.2

Supplementary Table 2. A detailed mapping of each individual learning objective to the corresponding reference(s) used in the systematic review by Pupic et al., illustrating the foundational studies that informed the development of the AI curriculum objectives.

Learning Objective	Reference from Pupic et al.	Potential Implementation Strategies
Ethics		
Identify key regulatory issues surrounding data sharing between healthcare institutions, academic institutions, and private organizations.	1-4	a) Weekly case-based or problem-based learning sets b) Facilitator and/or peer-led discussions in small group c) Optional AI-specific ethics modules or courses d) Participation in AI-related research
Analyze the implications of these regulatory issues on data sharing practices in healthcare	2, 3	
Apply appropriate response strategies to comply with regulatory requirements related to data sharing between healthcare institutions		
Explain the importance of data privacy in the context of using artificial intelligence (AI) with healthcare data	1, 2, 4-7	
Define equitable AI and explain its importance in promoting fairness and avoiding bias in AI applications	2, 3, 7-10	
Define and differentiate between the different types of biases that can appear in AI, including algorithmic, data, and user biases.	2, 3, 8, 9, 11	
Identify real-world examples of each type of bias and their impact on the effectiveness of AI applications.	2, 3, 8	
Develop strategies to mitigate and prevent the occurrence of biases in AI applications.	2, 3, 5, 8, 10, 11	
Apply strategies to promote the use of equitable AI and advocate for its implementation	2, 3, 12, 13	
Define patient rights and the ethical considerations related to using AI in healthcare	1-3, 5, 8, 13, 14	

Explain the importance of respecting patient rights when using AI and describe the potential benefits of doing so.	2, 13	
Legal		
Define data governance and explain its importance when working with AI.	2, 4, 5, 7	a) Weekly case-based or problem-based learning sets b) Facilitator and/or peer-led discussions in small group c) Optional AI-specific ethics modules or courses d) Participation in AI-related research
Identify the key components of a data governance framework and how they relate to AI.		
Apply appropriate data governance measures when working with AI.	2, 4, 5, 7, 15, 16	
Explain the importance of confidentiality in healthcare data when using AI.	1, 2, 4, 7, 15	
Identify potential risks to data privacy and best practices when using AI including relevant legal and regulatory requirements	1, 2, 4, 7, 9	
Apply appropriate confidentiality measures to ensure the privacy and security of healthcare data when using AI.	1, 2, 4, 7, 9, 15	
List and explain the various concerns surrounding liability when using AI in healthcare.	1, 2, 7	
Apply strategies to mitigate liability risks associated with the use of AI in healthcare.	1, 2	
Explain the importance of shared decision-making with AI and the physician's role in shared decision-making with AI.	1-5	
Understand the legal implications of shared decision-making with AI.		
List the key issues surrounding intellectual property of AI.	1, 2, 4	
Analyze the implications of intellectual property issues related to the use of AI in healthcare.		
List the key issues surrounding copyright of AI.		

Apply appropriate strategies to protect and manage copyright issues when using AI in healthcare.		
Theory		
Define and differentiate between statistical concepts of accuracy, F1 score, sensitivity, specificity, positive predictive value, negative predictive value, odds ratio, relative risk, positive and negative likelihood ratios.	1, 2, 8, 11, 12, 14, 17-19	a) Integrate AI cases and literature into existing biostatistics curriculum b) Critical appraisal and validation projects of AI literature and tools c) Hands-on sessions with commercially available AI tools such as point-of-care ultrasound or digital scribes. d) Online courses for advanced theory e) Participation in AI-related research
Interpret and apply these statistical concepts to real-world healthcare scenarios.	1, 2, 8, 14, 17, 18	
Understand, interpret, and explain the different types of statistics (descriptive vs inferential).		
Understand, interpret, and explain the different types of data (numerical vs categorical).	1, 2, 8, 14, 17, 18, 20	
Understand, interpret, use, and explain common terminology used in AI.	1-3, 5, 6, 14, 18, 21	
Identify the different domains of healthcare where AI has been successfully applied.	1, 2, 3, 14, 18	
Evaluate the strengths and benefits of using AI in each domain, including improved accuracy, efficiency, and cost-effectiveness.	1, 2, 5, 7, 8, 14, 17, 18, 21-24	
Explain how AI has impacted the quality of patient care and the healthcare industry as a whole.	2, 25	
Identify the limitations and challenges of using AI in different domains of healthcare.	1, 2, 5, 7, 8, 14, 18, 21, 22, 24	
Define and differentiate between big data and traditional data sets.	1, 2, 3, 7, 18	
Evaluate the economic impact of AI adoption in healthcare, including the costs associated with implementation and maintenance.	2, 5, 15	
Analyze the potential cost savings and revenue generation opportunities associated with using AI in healthcare.	2, 5	

Explain the basic structure and function of a computer, including the central processing unit, memory, and storage.	2	
Identify the different types of hardware components and their roles in computer operation.		
Evaluate the impact of hardware specifications on computer performance and application capabilities.		
Predict and anticipate how the workflow of physicians may change with the implementation of AI.	2, 15, 25, 26	
Identify techniques that will better facilitate the implementation of AI.	2, 12, 25	
Develop skills in data preprocessing, feature engineering, model selection, and evaluation.	2, 8, 14	
Apply these skills to solve real-world problems in healthcare using AI tools.	1-3, 6-8, 21, 27, 28	
Understand the fundamental concepts of programming, including data types, control structures, functions, and algorithms.	2, 4, 8, 13	
Develop skills in programming languages commonly used in healthcare, such as Python and R.	4, 8	
Understand the basic concepts and principles of machine learning.	1, 2, 11, 14	
Identify and differentiate between different types of machine learning, including supervised, unsupervised, and reinforcement learning.	1, 2	
Evaluate the strengths and limitations of each type of machine learning and their applications in healthcare.	1, 2, 9, 11, 14, 29	
Identify and differentiate between different types of regression analyses, including linear, logistic, and Poisson regression.	1, 2	
Understand the concept of model selection in machine learning.		

Identify and differentiate between different types of models, including decision trees, random forests, and support vector machines.	1, 2	
Evaluate the strengths and limitations of each type of model and their applications in healthcare.		
Understand the basic concepts and principles of deep learning.	1, 20	
Identify and differentiate between different types of deep learning, including convolutional neural networks and recurrent neural networks.	1	
Evaluate the strengths and limitations of each type of deep learning and their applications in healthcare.		
Understand the different applications of deep learning in healthcare, including image analysis, natural language processing, and time series analysis.		
Identify and differentiate between different types of models in deep learning, including autoencoders and generative adversarial networks.		
Understand the basic concepts and principles of natural language processing (NLP).		
Identify and differentiate between different applications of NLP in healthcare, including clinical documentation, patient communication, and disease surveillance.		
Evaluate the impact of NLP on the quality and efficiency of healthcare processes.		
Application		
Create research questions that are well-designed and specific to AI research	1, 2, 5, 8, 30	Incorporation of AI into the existing biostatistics curriculum, through integration of AI cases and reading literature
Collect and manage data effectively for AI research	2, 8, 14	
Apply principles of data stewardship to ensure the quality and security of AI data		

Preprocess data appropriately for AI research by cleaning, transforming, and selecting relevant features	2, 8, 11, 14	<p>about AI tools, would help minimize the disruption to curriculum. It would also expose students to critical appraisal and validation of AI literature and tools, in the same way that it covers critical appraisal of pharmaceuticals and other medical research.</p> <p>Providing students with hands-on sessions with AI tools currently used in the medical field during clinical rotations, such as point-of-care-ultrasound or digital scribes. This could also be accomplished with technologists teaching the sessions as they may be more familiar with the tools through their repeated use.</p> <p>For students who are more interested in AI, sponsorships for accessibility to online courses through platforms such as Coursera or eDX is a low barrier approach to AI education. Additionally, highlighting other extracurricular opportunities, including clubs or AI accredited sessions for continuing medical education</p>
Standardize data to ensure consistency and comparability for AI research purposes	2, 8, 14	
Develop and implement AI models for research purposes	2, 8, 13, 16	
Evaluate and select appropriate algorithms for specific AI problems, based on their strengths and limitations	2, 8, 13, 16, 20	
Train AI models using appropriate techniques and algorithms, and fine-tune them as needed	2, 8	
Validate AI models using appropriate statistical methods to ensure their accuracy and reliability for research purposes.	2	
Use different functions and tools to visualize data in order to gain insights from it	2, 8, 14	
Analyze and interpret data, including AI model input and output, to inform decision-making.	2, 5, 6, 8, 18	
Integrate evidence from AI models into clinical decision-making practices in healthcare	1-5, 8, 30	
Critically evaluate the integrity, reliability, and applicability of research on AI applications in healthcare	1, 2, 5, 8, 9, 11, 18, 30	
Apply programming concepts to build AI models, tools, and simple healthcare applications.	2, 8	
Define gradient descent in machine learning models	1, 2	
Implement regularization techniques to reduce overfitting in models	1, 4, 8	
Understand and apply backpropagation for deep learning models		
Execute and interpret error analysis in machine learning and deep learning models		

Use kernels to transform data in machine learning and deep learning models		<p>should be highlighted and available for students to see.</p> <p>Encouraging students to engage in AI-related research projects during their medical school education would allow them to take ownership of their AI knowledge and may lead to more ongoing interest in AI.</p>
Understand and apply clustering techniques for unsupervised learning		
Perform dimensionality reduction techniques such as PCA for feature selection and visualization		
Implement anomaly detection techniques for identifying outliers in data		
Apply vectorization techniques to optimize code in machine learning and deep learning models using Python		
Use TensorFlow to build and train deep learning models		
Use Keras to build and train deep learning models		
Perform hyperparameter tuning to optimize model performance		
Collaboration		
Develop strategies for establishing and maintaining positive relationships with colleagues involved in the AI side of healthcare, such as data scientists.	1, 2, 8, 15, 18, 29, 31, 32	<p>Providing students with hands-on sessions with AI tools currently used in the medical field would expose students to individuals from different professions, with different working knowledge of AI.</p> <p>Encouraging students to engage in AI-related research projects during their medical school education would allow students to work with a more diverse group of</p>
Distinguish between the roles of a physician, other healthcare provider, and data scientist to promote clear communication.	2, 8, 15, 18	
Engage in shared decision-making with colleagues focused on the AI aspect of healthcare to promote patient-centered care.	1-5, 13	
Reflect on one's own roles and limitations in the context of AI in healthcare, including ethical considerations and potential biases, to promote responsible use of AI tools.	1, 2, 5, 8, 14, 18	
Identify opportunities for learning and self-improvement with respect to one's AI abilities, including training programs and online	1, 2, 33	

resources, to ensure that one's skills and knowledge remain up-to-date.		faculty, learning more about different aspects of medicine.
Identify, select, and navigate credible sources to learn about AI in healthcare, including peer-reviewed publications, expert opinion, and government reports, to ensure that one is using accurate and reliable information.	1, 2, 5, 8, 30	
Explain the importance of patient inclusion when designing AI for healthcare to ensure that AI tools are designed and implemented in a way that reflects the needs and values of the patient population.	2, 13	
Communication		
Predict and anticipate how patient interactions may change with the implementation of AI	1, 2, 11, 25	Providing students with hands-on sessions with AI tools currently used in the medical field would expose students to individuals from different professions, with different working knowledge of AI. Encouraging students to engage in AI-related research projects during their medical school education would allow students to work with a more diverse group of faculty, learning more about different aspects of medicine. Discussing AI in CBL/PBL groups would prepare students to feel more confident when having interactions with others regarding AI.
Develop effective communication strategies to disseminate AI-related knowledge and research to colleagues in the healthcare industry.	1, 2, 6, 9, 10, 16, 18, 19, 21, 31, 32, 34	
Develop patient-friendly materials to disseminate AI-related knowledge and research to patients.	1, 2, 4-6, 9, 11, 18	
Demonstrate empathetic communication skills when discussing the use of AI in patient care, including patient-centered approaches that encourage patient trust and autonomy.	1, 2, 15, 25, 33	
Manage disagreements and emotionally charged conversations related to AI effectively, including techniques for de-escalation and conflict resolution.	1, 2, 25, 33	
Collect and synthesize relevant information from patients and other sources for use in AI analysis.	2	
Appropriately interpret and document results from AI analyses for use in patient care and other healthcare decision-making processes.	2, 5, 6, 18	

Quality Improvement		
Evaluate patient feedback to identify areas of improvement for AI in healthcare.	1, 2, 4, 5, 18	<p>Providing students with hands-on sessions with AI tools currently used in the medical field would expose students to the benefits and limitations of AI, allowing them to critically evaluate current tools for ways to improve.</p> <p>Encouraging students to engage in AI-related research projects during their medical school education would allow students to find quality improvement projects that address an area of interest for them.</p>
Propose solutions to improve the capability of AI in healthcare based on patient feedback and experience.	2, 24	
Analyze current applications of AI in healthcare to identify areas for improvement.	1, 2, 5, 8, 30	
Evaluate community health needs and propose solutions using AI to address these needs.	2	
Integrate patient feedback into the development and implementation of AI in healthcare.	1, 2, 4, 5, 18, 24	
Apply principles of user-centered design to improve the user experience of AI in healthcare.	1, 2, 14, 8	

Supplementary References

1. Lee, J., Wu, A. S., Li, D. & Kulasegaram, K. (Mahan). Artificial Intelligence in Undergraduate Medical Education: A Scoping Review. *Acad. Med.* **96**, S62 (2021).
2. Charow, R. *et al.* Artificial Intelligence Education Programs for Health Care Professionals: Scoping Review. *JMIR Med. Educ.* **7**, e31043 (2021).
3. Khurana, M. P. *et al.* Digital health competencies in medical school education: a scoping review and Delphi method study. *BMC Med. Educ.* **22**, 129 (2022).
4. Car, L. T. *et al.* Digital Health Training Programs for Medical Students: Scoping Review. *JMIR Med. Educ.* **7**, e28275 (2021).
5. Liyanage, H. *et al.* Artificial Intelligence in Primary Health Care: Perceptions, Issues, and Challenges. *Yearb. Med. Inform.* **28**, 41–46 (2019).
6. Teng, M. *et al.* Health Care Students' Perspectives on Artificial Intelligence: Countrywide Survey in Canada. *JMIR Med Educ* **8**, e33390 (2022).
7. Senbekov, M. *et al.* The Recent Progress and Applications of Digital Technologies in Healthcare: A Review. *Int. J. Telemed. Appl.* **2020**, 8830200 (2020).
8. Sapci, A. H. & Sapci, H. A. Artificial Intelligence Education and Tools for Medical and Health Informatics Students: Systematic Review. *JMIR Med. Educ.* **6**, e19285 (2020).
9. Blease, C. *et al.* Machine learning in medical education: a survey of the experiences and opinions of medical students in Ireland. *BMJ Health Care Inform.* **29**, e100480 (2022).
10. Kansal, R. *et al.* Differences in Knowledge and Perspectives on the Usage of Artificial Intelligence Among Doctors and Medical Students of a Developing Country: A Cross-Sectional Study. *Cureus* **14**, e21434.
11. Banerjee, M. *et al.* The impact of artificial intelligence on clinical education: perceptions of postgraduate trainee doctors in London (UK) and recommendations for trainers. *BMC Med. Educ.* **21**, 429 (2021).
12. Santomartino, S. M. & Yi, P. H. Systematic Review of Radiologist and Medical Student Attitudes on the Role and Impact of AI in Radiology. *Acad. Radiol.* **29**, 1748–1756 (2022).
13. Ejaz, H. *et al.* Artificial intelligence and medical education: A global mixed-methods study of medical students' perspectives. *Digit. Health* **8**, 20552076221089099 (2022).
14. Karaca, O., Çalışkan, S. A. & Demir, K. Medical artificial intelligence readiness scale for medical students (MAIRS-MS) – development, validity and reliability study. *BMC Med. Educ.* **21**, 112 (2021).
15. Yang, L. *et al.* Stakeholders' perspectives on the future of artificial intelligence in radiology: a scoping review. *Eur. Radiol.* **32**, 1477–1495 (2022).
16. Chan, K. S. & Zary, N. Applications and Challenges of Implementing Artificial Intelligence in Medical Education: Integrative Review. *JMIR Med. Educ.* **5**, e13930 (2019).
17. Giunti, G., Guisado-Fernandez, E., Belani, H. & Lacalle-Remigio, J. R. Mapping the Access of Future Doctors to Health Information Technologies Training in the European Union: Cross-Sectional Descriptive Study. *J. Med. Internet Res.* **21**, e14086 (2019).
18. Grunhut, J., Wyatt, A. T. & Marques, O. Educating Future Physicians in Artificial Intelligence (AI): An Integrative Review and Proposed Changes. *J. Med. Educ. Curric. Dev.* **8**, 238212052110368 (2021).
19. Park, C. J., Yi, P. H. & Siegel, E. L. Medical Student Perspectives on the Impact of Artificial Intelligence on the Practice of Medicine. *Curr. Probl. Diagn. Radiol.* **50**, 614–619 (2021).
20. Pinto dos Santos, D. *et al.* Medical students' attitude towards artificial intelligence: a multicentre survey. *Eur. Radiol.* **29**, 1640–1646 (2019).
21. Sit, C. *et al.* Attitudes and perceptions of UK medical students towards artificial intelligence and radiology: a multicentre survey. *Insights Imaging* **11**, 14 (2020).
22. Gillissen, A., Kochanek, T., Zupanic, M. & Ehlers, J. Medical Students' Perceptions towards Digitization and Artificial Intelligence: A Mixed-Methods Study. *Healthcare* **10**, 723 (2022).

23. Blease, C. *et al.* Artificial Intelligence and the Future of Primary Care: Exploratory Qualitative Study of UK General Practitioners' Views. *J. Med. Internet Res.* **21**, e12802 (2019).
24. Blease, C. *et al.* Computerization and the future of primary care: A survey of general practitioners in the UK. *PLOS ONE* **13**, e0207418 (2018).
25. Blease, C., Kharko, A., Locher, C., DesRoches, C. M. & Mandl, K. D. US primary care in 2029: A Delphi survey on the impact of machine learning. *PLOS ONE* **15**, e0239947 (2020).
26. van Hoek, J. *et al.* A survey on the future of radiology among radiologists, medical students and surgeons: Students and surgeons tend to be more skeptical about artificial intelligence and radiologists may fear that other disciplines take over. *Eur. J. Radiol.* **121**, 108742 (2019).
27. Alelyani, M. *et al.* Radiology Community Attitude in Saudi Arabia about the Applications of Artificial Intelligence in Radiology. *Healthcare* **9**, 834 (2021).
28. Doğaner, A. The Approaches and Expectations of The Health Sciences Students Towards Artificial Intelligence. *Karya J. Health Sci.* **2**, 5–11 (2021).
29. Wood, E. A., Ange, B. L. & Miller, D. D. Are We Ready to Integrate Artificial Intelligence Literacy into Medical School Curriculum: Students and Faculty Survey. *J. Med. Educ. Curric. Dev.* **8**, 23821205211024078 (2021).
30. Blacketer, C. *et al.* Medical student knowledge and critical appraisal of machine learning: a multicentre international cross-sectional study. *Intern. Med. J.* **51**, 1539–1542 (2021).
31. Gong, B. *et al.* Influence of Artificial Intelligence on Canadian Medical Students' Preference for Radiology Specialty: ANational Survey Study. *Acad. Radiol.* **26**, 566–577 (2019).
32. Auloge, P. *et al.* Interventional radiology and artificial intelligence in radiology: Is it time to enhance the vision of our medical students? *Insights Imaging* **11**, 127 (2020).
33. Han, E.-R. *et al.* Medical education trends for future physicians in the era of advanced technology and artificial intelligence: an integrative review. *BMC Med. Educ.* **19**, 460 (2019).
34. Reeder, K. & Lee, H. Impact of artificial intelligence on US medical students' choice of radiology. *Clin. Imaging* **81**, 67–71 (2022).