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Editorial

Integrating Artificial Intelligence Literacy into the Foundation Course of Competency-Based Medical Education: A Proposed Module for Indian Undergraduate Medical Students

The introduction of the Competency-Based Medical Education (CBME) curriculum in India in 2019 marked a transformative shift toward producing more competent, ethical, and patient-centered medical graduates. The foundation course, introduced as an essential preparatory component, is designed to orient students to the medical profession and equip them with core professional, communication, and technological competencies. The revised CBME 2024 guidelines further emphasize the acquisition of enhanced skills in information technology and artificial intelligence (AI), reflecting the growing relevance of digital transformation in healthcare.[1]

Artificial intelligence has rapidly evolved from a futuristic concept to an integral component of modern healthcare systems, with applications ranging from diagnostic imaging and predictive analytics to workflow optimization and medical education. Yet, despite its increasing ubiquity, formal AI literacy remains absent from the undergraduate medical curricula in India. This creates a paradox wherein medical students routinely use AI-enabled tools without structured guidance regarding their capabilities, limitations, ethical implications, or responsible application.

The role of the Indian Medical Graduate (IMG), as currently envisaged by the National Medical Commission, encompasses seven domains: clinician, leader, communicator, lifelong learner, professional, critical thinker, and researcher. In the present digital era, there is a compelling case for recognizing an eighth role—the AI literate physician. As Bansal and Jindal argued, future clinicians must be trained to critically understand and responsibly engage with AI technologies.[2] Likewise, recent evidence demonstrates strong student consensus supporting the integration of AI education into undergraduate medical training.[3]

A common concern within the medical fraternity is whether AI will replace physicians. A more realistic perspective is that AI will not replace doctors; rather, AI-literate doctors are likely to outperform AI-ignorant doctors. Consequently, the educational imperative is not resistance to AI adoption but thoughtful curricular integration.

Given the already substantial MBBS curriculum load, dedicating extensive independent teaching hours to AI may be impractical. However, the 80-hour foundation course offers an ideal opportunity to introduce students to foundational AI concepts early in their professional journey. This initial sensitization can promote self-directed learning and responsible adoption throughout undergraduate training.

This editorial proposes a structured 20-hour AI literacy module (Table-1), divided into five thematic units and thirteen competencies, designed for incorporation into the foundation course. The module aims to enable undergraduate medical students to understand core AI concepts, critically evaluate its applications and limitations, appreciate ethical and legal considerations, and responsibly utilize AI as future healthcare professionals.

Table-1: AI Literacy Module for Undergraduate Medical Students

Unit & Allotted Time	Competency	Teaching-Learning (TL) Methods	Assessment Methods
Unit 1: Introduction to AI in Healthcare ***(4 Hours)***	**AI 1.1:** Define basic AI, Machine Learning (ML), and Deep Learning (DL) concepts in a clinical context	- Interactive Lecture (2 hours) with real-world clinical analogies - Small Group Discussion (SGD) (2 hours): "Will AI replace doctors?"	- Classroom Quiz (MCQs via Mentimeter/ Kahoot) - Viva voce
	AI 1.2: Differentiate between automated tools and human expert judgment		
	AI 1.3: Outline the historical evolution of digital tools in medicine		

Unit 2: How AI "Sees" and "Thinks" (Data Literacy) ***(4 Hours)***	**AI 2.1:** Identify medical data types (structured vs. unstructured like Electronic Health Records vs. X-rays) **AI 2.2:** Explain basic concepts of diagnostic accuracy metrics (Sensitivity, Specificity, True/False Positives) **AI 2.3:** Recognize how biased data leads to biased medical outcomes	- Interactive Lecture (2 hours) - Case-Based Learning (CBL) (2 hours): Analyzing a hypothetical case where an AI model missed a diagnosis due to poor data	- Spotter: Match a data type or metric to its clinical definition - Short Answer Questions (SAQs).
Unit 3: AI Applications Across Medical Specialities ***(4 Hours)***	**AI 3.1:** List current validated applications of AI in radiology, pathology, dermatology, and cardiology **AI 3.2:** Describe how Large Language Models (LLMs) assist in administrative workflows (e.g., automated clinical note-taking)	- Video-Assisted Lecture & Live Demo (2 hours): Witnessing an open-source AI outline a chest X-ray lung field - Panel Presentation by guest clinicians or senior faculty (2 hours)	- Reflective writing/Logbook entry on an AI tool's potential utility in a primary health center
Unit 4: Ethical, Legal, and Privacy Boundaries ***(4 Hours)***	**AI 4.1:** Discuss patient data privacy, consent, and confidentiality challenges with AI **AI 4.2:** Explain the "black box" concept (lack of transparency in AI choices) and the principle of clinical override **AI 4.3:** Articulate the legal accountability of a medical practitioner when utilizing AI tools	- Roleplay (2 hours): A patient objects to their data being used to train an algorithm - Directed Debate/ Group Discussion (2 hours): "Who is responsible for an AI diagnostic error—the tech company or the doctor?"	- Objective Structured Clinical Examination (OSCE) station: Communicating AI-driven risk to a simulated patient. - Reflective writing
Unit 5: AI as a Tool for Lifelong Learning & Research ***(4 Hours)***	**AI 5.1:** Use Generative AI safely to synthesize scientific literature without falling into "hallucinations" (fabricated information) **AI 5.2:** Demonstrate basic prompt engineering to extract accurate, verified medical summaries from trusted databases	- Hands-on Workshop in the computer lab (2 hours): Practicing prompt formulation on medical search queries - Self-Directed Learning (SDL) & Presentation (2 hours)	- Logbook entry - Final 20-mark online module completion test

Artificial intelligence is poised to reshape every dimension of healthcare, from diagnosis and treatment planning to education and research. Preparing future physicians to navigate this transformation is no longer optional but essential. Integrating structured AI literacy into the CBME foundation course offers a practical and scalable strategy to prepare undergraduate medical students for this evolving landscape. The proposed module represents an initial step toward cultivating responsible, critical, and informed engagement with AI. By equipping students with foundational AI competencies early in their training, Indian medical education can ensure that future graduates are not merely passive users of technology but thoughtful clinicians capable of harnessing AI ethically and effectively for improved patient care.

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