



The Imperative to Integrate AI Education for Enhancing Clinical Diagnostic Skills in Iranian Medical Students

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Dear Editor-in-chief,

Artificial intelligence (AI) technologies have become transformative tools in clinical medicine, significantly enhancing diagnostic accuracy and patient outcomes. To prepare future physicians in Iran capable of effectively utilizing these innovations, comprehensive integration of AI education into medical curricula is essential. Despite existing challenges—including limited faculty expertise, insufficient curricular inclusion, and ethical considerations—innovative and proactive educational strategies can equip students with critical competencies. This letter discusses the necessity, existing gaps, and evidence-based recommendations for embedding AI literacy within Iranian medical education to better prepare future clinicians.

Key Words: Artificial intelligence, Clinical diagnosis, Iran, Medical education.

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1. INTRODUCTION

The rapid and accelerating integration of artificial intelligence (AI) in clinical medicine—especially in diagnostic imaging and predictive analytics—is fundamentally reshaping healthcare worldwide by enhancing diagnostic precision and patient care quality. To meet global healthcare standards and technological advancements, it is imperative that medical students in Iran gain proficiency with AI technologies. Comprehensive integration of AI education into medical curricula is an urgent priority to prepare future clinicians for contemporary, patient-centered clinical practice (1–7).

2. Current Educational Landscape and Challenges

Iranian medical education currently faces significant obstacles in preparing students for an AI-integrated clinical environment. Despite the growing prominence of AI in healthcare, its application in medical curricula remains fragmented and superficial. Key challenges include:

- **Limited Faculty Expertise:** Many institutions lack adequate faculty skilled in AI and clinical applications, restricting effective curriculum development and instruction (7-10).
- **Fragmented Curricular Integration:** AI is often treated as a supplementary topic rather than a core element, leading to insufficient exposure and practical competency among students (11, 12).
- **Concerns over Curriculum Relevance:** Rapid advancements in AI technology raise fears of curricular obsolescence, deterring comprehensive adoption. However, adaptable curricula with regular content updates can address this issue (1, 9, 13).
- **Ethical and Social Considerations:** Critical issues such as data privacy, bias in algorithms, informed consent, and medico-legal responsibilities require an embedded ethical framework within AI education, which is currently insufficiently emphasized (14-16).

Addressing these challenges is vital for equipping future Iranian physicians with the competencies necessary for the evolving digital healthcare landscape.

3. Educational Strategies and Recommendations

To overcome current challenges, Iranian medical education policymakers and institutions should adopt a multifaceted approach:

- **Curricular Reform and Integration:** Embed AI comprehensively across medical education, from foundational principles to clinical applications. Interdisciplinary coursework involving medicine, computer science, data analytics, and bioethics is vital (17).
- **Faculty Development:** Invest in specialized training programs for faculty and cultivate international collaborations to develop instructional capacity and ensure curriculum relevance (17, 18).
- **Active and Experiential Learning:** Utilize interactive methods such as hackathons, case-based learning, simulations, and collaborative projects to foster practical AI skills and critical thinking (9, 17, 19).
- **Ethics and Social Responsibility:** Incorporate ethics-focused modules addressing privacy, bias, accountability, and medico-legal challenges to promote responsible use and patient safety awareness (14-16).
- **Dynamic and Continuous Content Updates:** Implement monitoring and feedback mechanisms to regularly revise AI curricula, ensuring they remain current with technological advancements (9, 11, 20).
- **Systemic Collaboration:** Facilitate coordinated efforts among policymakers, educators, clinicians, and AI technologists to realize a unified vision for AI-enhanced medical education and clinical practice (9, 21).

4. CONCLUSION

Comprehensively embedding AI education into Iran's medical curricula is essential for preparing physicians who can effectively harness AI's potential to improve diagnostic accuracy and patient care. By implementing strategic curricular reforms, faculty development, active experiential learning, and robust ethical education, Iranian medical education can cultivate clinicians who are not only proficient users but also critical evaluators and innovators within an AI-augmented healthcare landscape. Such integration will be pivotal in elevating the quality, efficacy, and innovation readiness of healthcare delivery nationwide.

5. AUTHORS' CONTRIBUTIONS

Study conception or design: SS; Data analyzing and draft manuscript preparation: SS and KS; Critical revision of the paper: SS; Supervision of the research: SS; Final approval of the version to be published: SS, and KS.

6. CONFLICT OF INTEREST: None.

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