Preparing Tomorrow's Physicians for the AI Era: Integrating Artificial Intelligence Agents into Neuroscience and Neurodegenerative Disease Education

Mohsin Yakub
California University of Science and Medicine, California, United States

Abstract:

The rapid evolution of artificial intelligence (AI) is transforming healthcare, particularly in the diagnosis, management, and research of neurological and neurodegenerative disorders. As AI-powered clinical decision support systems, digital biomarkers, and intelligent agents become increasingly integrated into neurological practice, medical education must evolve accordingly. Traditional neuroscience curricula have focused primarily on foundational neuroanatomy, neurophysiology, and disease mechanisms, yet often provide limited exposure to AI-driven diagnostic tools, machine learning applications, and the ethical considerations surrounding their use.

This presentation proposes a curriculum framework that integrates AI agents throughout undergraduate medical education using a longitudinal, competency-based approach. Rather than treating AI as a standalone topic, the framework embeds intelligent clinical assistants into case-based learning, team-based learning, simulation, and clinical reasoning exercises involving disorders such as Alzheimer's disease, Parkinson's disease, multiple sclerosis, stroke, and other neurological conditions. AI agents serve as adaptive learning partners, providing personalized feedback, facilitating differential diagnosis, interpreting neuroimaging, summarizing emerging evidence, and supporting reflective learning while emphasizing the importance of human oversight and clinical judgment.

The proposed model aligns AI integration with competency-based medical education principles, emphasizing clinical reasoning, evidence appraisal, ethical AI use, interdisciplinary collaboration, and lifelong learning. Challenges including faculty development, assessment strategies, curriculum governance, data privacy, and responsible AI implementation are also discussed.

As neuroscience and neurodegenerative therapeutics continue to advance alongside AI technologies, preparing future physicians requires more than technological literacy; it demands thoughtful curricular transformation that develops clinicians capable of partnering effectively with intelligent systems while maintaining patient-centered care. This framework offers practical strategies for educators seeking to modernize neuroscience education for the next generation of healthcare professionals.

Keywords:

Artificial Intelligence, Medical Education, Curriculum Development, Neuroscience Education, Neurodegenerative Diseases, Competency-Based Medical Education, Intelligent Agents, Clinical Reasoning.