

The New Residency: What Are the Essential AI Knowledge Requirements for Digital Health Professionals?

Rasit Dinc

Rasit Dinc Digital Health & AI Research

Published: October 4, 2022 | Medical Imaging AI

DOI: [10.5281/zenodo.17997763](https://doi.org/10.5281/zenodo.17997763)

Abstract

The New Residency: What Are the Essential AI Knowledge Requirements for Digital Health Professionals? The rapid integration of Artificial Intelligence (...)

The New Residency: What Are the Essential AI Knowledge Requirements for Digital Health Professionals?

The rapid integration of Artificial Intelligence (AI) into healthcare is fundamentally reshaping the landscape of medical practice, demanding a new set of competencies from all professionals, particularly those in training. The question is no longer *if* AI will be part of the clinical workflow, but *how* future practitioners will be formally trained to use it safely, ethically, and effectively. This shift necessitates a critical examination of what constitutes **residency requirements for AI knowledge** in the digital health era, moving beyond mere technological literacy to a deep, critical understanding of AI's implications [1].

The Imperative for AI Competency in Graduate Medical Education

For medical residents, the need for structured AI education is paramount. AI tools are increasingly used in diagnostics, treatment planning, and administrative tasks, making them integral to modern clinical decision-making. However, without formal training, residents risk becoming passive users of black-box algorithms, unable to critically appraise the tools they employ.

Leading academic bodies have begun to define the core competencies required. The Association of American Medical Colleges (AAMC) emphasizes that any AI-driven system in medical education and selection must be guided by principles that ensure fairness, transparency, and human oversight [2]. These principles underscore the need for residents to understand the underlying mechanics and ethical pitfalls of AI, not just its surface-level application.

Defining the Core Domains of AI Competency

The required AI knowledge for residents extends across several critical domains, moving from foundational theory to practical, ethical application. Research into AI competencies for primary care professionals, for instance, has proposed six key domains that serve as a robust framework for graduate medical education [3]:

| Domain | Description | Key Learning Objectives for Residents | | :--- | :--- | :--- |
| **1. Foundational Knowledge** | Understanding what AI is, its different forms (ML, LLMs), and its capabilities and limitations. | Define AI terminology; differentiate between supervised, unsupervised, and reinforcement learning; understand data requirements. | | **2. Critical Appraisal** | The ability to

evaluate the validity, reliability, and potential bias of an AI tool. | Assess an AI tool's performance metrics (e.g., sensitivity, specificity); identify sources of algorithmic bias; understand generalizability. | | **3. Medical Decision-Making** | Knowing when and how to integrate AI-derived insights into clinical judgment. | Determine appropriate clinical scenarios for AI use; recognize when AI output conflicts with clinical intuition; maintain ultimate responsibility for patient care. | | **4. Technical Use** | Practical skills for interacting with and operating AI-enabled systems. | Navigate AI-assisted imaging viewers; correctly input data; troubleshoot common technical issues. | | **5. Patient Communication** | Effectively communicating the role of AI in a patient's care plan. | Explain AI results to patients in an understandable manner; discuss the risks and benefits of AI use; maintain patient trust. | | **6. Awareness of Unintended Consequences** | Recognizing the ethical, legal, and social implications of AI in healthcare. | Identify potential for data privacy breaches; understand regulatory frameworks (e.g., HIPAA, FDA); recognize the impact on health equity. |

This framework highlights that AI knowledge is not a separate elective but a fundamental layer of professional practice, integrating technical understanding with ethical and patient-centered care.

Ethical and Regulatory Residency: The Human Element

Perhaps the most crucial requirement is the ethical and regulatory residency. The World Health Organization (WHO) and other global bodies have issued guidance on the ethics and governance of AI in health, emphasizing the need for human oversight and the protection of patient autonomy [4].

For residents, this translates into a requirement to: **Protect against Algorithmic Bias:** Residents must be trained to recognize how historical data can embed bias into algorithms, leading to disparities in care for underrepresented populations [2]. **Ensure Data Privacy:** A deep understanding of data governance, security protocols, and compliance with regulations like HIPAA is non-negotiable, as AI systems rely on vast amounts of sensitive patient data. **Incorporate Human Judgment:** The AAMC stresses the irreplaceable value of human judgment. Residents must be taught to use AI as a powerful assistant, not a replacement for their own critical thinking and ethical responsibility [2].

The future of digital health relies on professionals who are not only technically proficient but also ethically grounded. For more in-depth analysis on this topic, including the evolving regulatory landscape and practical strategies for integrating AI education into medical curricula, the resources at www.rasitdinc.com provide expert commentary and professional insight.

Conclusion

The residency requirements for AI knowledge are rapidly solidifying into a comprehensive curriculum that spans technical, clinical, and ethical domains. The goal is to cultivate a generation of healthcare professionals who can harness the transformative power of AI while upholding the highest standards of patient safety and health equity. This educational evolution is essential to ensure that AI serves as a true advancement for all of digital health.

*

References

- [1] Lee, Y. M., et al. (2024). *Defining Medical AI Competencies for Medical School Graduates: A Delphi Study*. Academic Medicine. [\[https://journals.lww.com/academicmedicine/fulltext/2024/05000/defining_medical_ai_competencies_for_n\]](https://journals.lww.com/academicmedicine/fulltext/2024/05000/defining_medical_ai_competencies_for_n) [\[https://journals.lww.com/academicmedicine/fulltext/2024/05000/defining_medical_ai_competencies_for_n\]](https://journals.lww.com/academicmedicine/fulltext/2024/05000/defining_medical_ai_competencies_for_n)
- [2] AAMC. (n.d.). *Principles for Responsible AI in Medical School and Residency Selection*. [\[https://www.aamc.org/about-us/mission-areas/medical-education/principles-ai\]](https://www.aamc.org/about-us/mission-areas/medical-education/principles-ai) [\[https://www.aamc.org/about-us/mission-areas/medical-education/principles-ai\]](https://www.aamc.org/about-us/mission-areas/medical-education/principles-ai)

[3] Liaw, W., et al. (2022). *Competencies for the Use of Artificial Intelligence in Primary Care*. Annals of Family Medicine*. [https://pmc.ncbi.nlm.nih.gov/articles/PMC9705044/]
(https://pmc.ncbi.nlm.nih.gov/articles/PMC9705044/)

[4] WHO. (2024). WHO releases AI ethics and governance guidance for large multi-modal models. [https://www.who.int/news/item/18-01-2024-who-releases-ai-ethics-and-governance-guidance-for-large-multi-modal-models]
(https://www.who.int/news/item/18-01-2024-who-releases-ai-ethics-and-governance-guidance-for-large-multi-modal-models)

Rasit Dinc Digital Health & AI Research

<https://rasitdinc.com>

© 2022 Rasit Dinc