AI Note │ Received 31 March 2026; Revised 28 April 2026; Accepted 28 April 2026; Published 10 June 2026
https://doi.org/10.55092/aiplus20260002

Artificial intelligence as a clinical tool

Daniel Ruiz-Fernandez*

Department of Computer Technology, University of Alicante, Alicante, Spain; E-mail: druiz@ua.es

Highlights:

- The use of AI in medicine has seen a significant increase in recent years.
- AI can be regarded as a clinical tool and must meet the requirements inherent to such tools.
- Key aspects associated with the use of AI in medicine are presented.

Abstract: Artificial intelligence can now be found in every sector, and the healthcare sector is no exception. In recent years, the use of artificial intelligence in medicine has proliferated, playing a significant role as a diagnostic tool in certain fields. According to this situation, we need to consider how these tools can be integrated into clinical practice and agree on the features they should incorporate. This document proposes a set of characteristics to be addressed, taking into account traditional clinical tools: validity, safety, responsibility, usability, continuous evaluation, transparency and equity.

Keywords: artificial intelligence; healthcare; clinical tool; medicine

1. Introduction

The incorporation of artificial intelligence systems into the healthcare domain is rapidly transforming contemporary clinical practice and, at times, doing so without appropriate oversight. This commentary briefly examines its evolution, implications, and the challenges that must be a-ddressed for its proper integration into clinical activity.

The use of artificial intelligence (AI) in healthcare is not something that began in the 21st century. The first applications of AI in the medical field date back to the 1970s with the emergence of so called expert systems. One such system was MYCIN [1], developed at Stanford to diagnose bacterial infections in a manner comparable to a clinical expert. Although this rule based system was never deployed outside controlled environments, it contributed to demonstrating the feasibility of AI as a support tool for healthcare specialists. The Present Illness Program (PIP) was another AI-based system which model the reasoning processes that clinicians use when interpreting patient findings [2]. CASNET [3] was aimed to represent disease mechanisms and their relationships to clinical manifestations, providing a novel way to link pathophysiology with diagnosis. INTERNIST was another example, this time focused on large-scale diagnostic reasoning in internal medicine [4]. Many similar systems followed, helping establish a research line focused on what we now call clinical decision support systems, which essentially consist of using AI techniques to implement systems that can be employed by medical specialists to complement their diagnostic opinions. Based on a set of rules or prior learning, these systems

can offer diagnostic alternatives that enable more tailored and personalized treatments. For the most part, these systems remained confined to controlled environments, primarily aimed at publishing research findings rather than real clinical application. However, this laboratory bound trend has ended, and AI systems are now beginning to spread into clinical environments as an additional diagnostic instrument.

2. Artificial intelligence and healthcare today

After this brief historical overview, today it is possible to find AI based tools in clinical settings that shape or support diagnostic decisions, help prioritize patients, suggest treatments or personalized therapies, and more. For example, in radiology, systems are used to detect pulmonary nodules on Computed Tomography (CT) images with high accuracy [5]; dermatology uses AI tools to identify suspicious lesions [6]; ophthalmology employs AI to assist in diagnosing ocular diseases [7]; it is also used to predict and manage sepsis [8]; in cardiology to detect and predict arrhythmias [9]; and similar examples can be found in virtually every medical specialty. Artificial intelligence has been widely and transversally integrated into numerous areas of contemporary medicine: clinical diagnosis, radiology, surgery, risk stratification, personalized medicine, drug discovery, optimization of clinical trials, management of healthcare systems, *etc*. [10–12]. According to [13], the FDA approved the clinical use of more than 200 AI based devices in 2023 for specialties such as radiology, neurology, cardiology, urology, anesthesiology, and others. In 2015, only six were approved. This evolution of AI enabled clinical devices parallels research activity in the same domain. A search in the PUBMED database [14] for the term “artificial intelligence” returns more than 48,000 articles in 2025, compared with 6478 published in 2015. It is reasonable to assume that this growth in AI and medicine related research will also lead to a considerable increase in technology transfer and, therefore, the use of AI as a clinical instrument. The research focus has also shifted: when viewed purely as a technological tool, studies concentrate mainly on computational and algorithmic performance; but when considered a clinical instrument, attention must also include aspects such as validity and patient safety.

Despite the rapid expansion of artificial intelligence in healthcare, a growing body of literature highlights important risks associated with its accelerated and sometimes over-enthusiastic adoption. Ethical analyses and critical reviews warn that AI systems may exacerbate existing biases, lack transparency, and pose challenges in accountability if they are deployed without sufficient validation [15]. At the same time, evidence suggests that the pace of implementation may be outstripping the maturity of regulatory frameworks and real-world evidence, raising concerns about safety, equity, and long-term effectiveness [16]. From a global perspective, there is also a risk that poorly governed AI adoption could widen health disparities, particularly if tools are developed using non-representative data and deployed unevenly across health systems [17]. There are many considerations, both technical and ethical, associated with the use of artificial intelligence in the healthcare domain, and reaching a consensus on the procedures to be followed in order to ensure the highest quality of AI models applied to healthcare remains complex.

3. Key aspects of AI in clinical practice

Given the growth in both research and technological transfer in AI applied to medicine, it is necessary to address the characteristics that AI must possess to effectively improve health. If we consider AI as a clinical instrument, it is important to account for seven inherent factors.

(1) Validity: AI, like any clinical tool, must demonstrate accuracy and consistency in the environment and population where it will be used.

(2) Safety: AI based instruments may pose risks such as incorrect alerts, overconfident parameters, vulnerability to data distribution shifts, hidden variables, and more.

(3) Responsibility: AI may "recommend" or "suggest," but it is the clinical specialist who ultimately decides—just as with any traditional clinical instrument.

(4) Usability: alignment with clinical workflows and the procedures commonly performed by healthcare professionals is essential for successful integration into diagnostic circuits.

(5) Continuous evaluation: unlike traditional clinical instruments, AI models can easily change as they adapt to new data during clinical use. Therefore, continuous evaluation may be needed to ensure that their metrics remain appropriate in real clinical settings. Excessive dependence on these devices must also be studied and mitigated if necessary.

(6) Transparency: clinicians should be able to understand how an AI system produces a given output. Lack of interpretability can limit error analysis and make it difficult to justify clinical decisions.

(7) Equity: AI models may introduce equity issues and biases if they are not properly trained with adequately representative populations.

Just as traditional clinical instruments include a technical data sheet with their specifications, AI based instruments should also include documentation describing the characteristics of the employed models. This should cover usage scenarios, the type of population for which the system is suitable, and the performance metrics obtained by the algorithms—such as sensitivity and specificity—to support clinicians in decision making based on the AI enabled clinical instrument. The technical sheet should also define input variables and their minimum required characteristics (e.g., image quality, if applicable). Consequently, based on both metrics and input variables, the sheet should include recommendations to guide decision making in uncertain cases, as well as safety related information about system limits and the competencies required for its use depending on the clinical role (physician, nurse, technician, *etc*.). Finally, as with other clinical devices, it may also be useful to include information regarding system maintenance and update policies, as these factors may affect proper functioning of the AI enabled instrument.

We find ourselves facing a new landscape, one that has emerged with unprecedented speed (other technologies such as the Internet or smartphones took years to achieve global adoption), and whose regulation is limited and reactive, adapting existing frameworks as needs arise. In healthcare, there are two distinct user groups with different needs. On one hand, healthcare professionals must understand what they are using—just as they understand how a sphygmomanometer or an electrocardiograph works—in order to trust both the device and its results. This understanding does not refer to the technical intricacies but to the basic functioning that can help detect errors (such as artifacts in an ECG), optimize usage (e.g., a pulse oximeter should not be used on a tattooed finger), and ultimately professionalize its application. On the other hand, patients—passive users of clinical AI devices—require two key elements: high reliability and strong usability. Regarding reliability, the device's output must be highly

trustworthy, just as a blood pressure monitor provides reliable readings independent of the subsequent clinical interpretation. Regarding usability, for an AI based clinical device to become widespread among patients—when direct patient use is intended—it must be simple and intuitive.

4. Conclusion

In the preceding paragraphs, I have addressed three aspects that I consider fundamental in AI applied to health. First, the extraordinary surge in recent years in the number of studies, products, and developments in this field. Next, I offer a brief analysis of the elements that should be considered to foster the transfer and clinical use of AI in medicine. Finally, I outline potential needs depending on the type of user of AI enabled clinical devices. Ultimately, artificial intelligence is no longer an experimental resource but an emerging clinical instrument that requires clear standards, solid regulation, and a proper understanding by healthcare professionals. While its potential is enormous, its impact will depend on our collective ability to ensure that these systems are safe, transparent, equitable, and truly oriented toward patient benefit.

Declaration of generative AI and AI-assisted technologies

During the preparation of this manuscript, the author used generative AI tools only to improve language and readability. Specifically, the author used COPILOT for language polishing only in limited sections. The author takes full responsibility for the content of the manuscript.

Conflicts of interest

Daniel Ruiz-Fernandez holds the position of Associate Editor for *AI+* and has not peer reviewed or made any editorial decisions for this paper.

References

[1] Shortliffe EH. *Computer-Based Medical Consultations: MYCIN*. New York: Elsevier, 1976.
[2] Pauker SG, Gorry GA, Kassirer JP, Schwartz WB. Towards the simulation of clinical cognition: taking a present illness by computer. *Am. J. Med.* 1976, 60(7):981–996.
[3] Weiss SM, Kulikowski CA. *A Practical Guide to Designing Expert Systems*. Reading: Addison-Wesley, 1984.
[4] Miller RA, Pople HE, Myers JD. Internist-I, an experimental computer-based diagnostic consultant for general internal medicine. *N. Engl. J. Med.* 1982, 307:468–476.
[5] Nam JG, Hwang EJ, Kim J, Park N, Lee EH, *et al.* AI improves nodule detection on chest radiographs in a health screening population: a randomized controlled trial. *Radiology* 2023, 307(2):221894.
[6] Groh M, Badri O, Daneshjou R, Koochek A, Harriset C, *et al*. Deep learning-aided decision support for diagnosis of skin disease across skin tones. *Nat. Med.* 2024, 30(2):573–583.
[7] Wolf RM, Channa R, Lehmann HP, Abramoff MD, Liu TYA. Clinical implementation of autonomous artificial intelligence systems for diabetic eye exams: considerations for success. *Clin. Diabetes* 2024, 42(1):142–149.
[8] Wu M, Du X, Gu R, Wei J. Artificial intelligence for clinical decision support in sepsis. *Front. Med.* 2021, 8:665464.

[9] Nasser A, Michalczak M, Żądło A, Tokarek T. AI-powered precision: revolutionizing atrial fibrillation detection with electrocardiograms. *J. Clin. Med.* 2025, 14(14):4924.

[10] Mohajer-Bastami A, Moin S, Ahmad S, Ahmed AR, Pouwels S, *et al.* Artificial intelligence in healthcare: applications, challenges, and future directions. *Front. Digit. Health* 2025, 7:1644041.

[11] Poon EG, Lemak C, Rojas JC, Guptill J, Classen D. Adoption of artificial intelligence in healthcare: survey of health system priorities, successes, and challenges. *J. Am. Med. Inf. Assoc.* 2025, 32(7):1093–1100.

[12] Zhao L, Liu S, Xin T, Tan J, Wang X, *et al.* AI agents in healthcare: applications, evaluations, and future directions. *npj Artif. Intell.* 2026, 2(1):31.

[13] Stanford Human-Centered AI Institute, Stanford University. The 2025 AI index report. 2025. Available: https://hai.stanford.edu/ai-index/2025-ai-index-report (accessed on 21/02/2026)

[14] National Library of Medicine. PubMed. National Center for Biotechnology Information, Bethesda, 1997. Available: https://pubmed.ncbi.nlm.nih.gov/ (accessed on 21/02/2026)

[15] Weiner EB, Dankwa-Mullan I, Nelson WA, Hassanpour S. Ethical challenges and evolving strategies in the integration of artificial intelligence into clinical practice. *PLOS Digit. Health* 2025, 4(4):e0000810.

[16] Palaniappan K, Lin EYT, Vogel S, Lim JCW. Gaps in the global regulatory frameworks for the use of artificial intelligence (AI) in the healthcare services sector and key recommendations. *Healthcare* 2024, 12(17):1730.

[17] Chen I, Pierson E, Rose S, Joshi S, Ferryman K, *et al.* Ethical machine learning in healthcare. *Annu. Rev. Biomed. Data Sci.* 2021, 4(1):123–144.