

Artificial Intelligence in Diagnosis: Tool or Threat?

Laiba Afzal

1st Year BDS, Islamabad Medical and Dental College, Islamabad, Pakistan

Key points:

- Human-AI Partnership
- AI In Rare Disease Detection
- Implications And Accountability
- Current Challenges

Artificial Intelligence (AI) is reshaping modern healthcare, especially in disease diagnosis. Its ability to process large amounts of medical data quickly and with precision has proven extremely helpful in early detection and supporting clinical decisions. From analyzing radiology scans to identifying rare diseases, AI is becoming an important part of today's medical toolkit.

However, alongside its impressive contributions, AI brings a fair share of concerns. Can machines really be trusted to make decisions that affect people's lives? Questions around data privacy, fairness in algorithm training and the lack of transparency in how some AI systems work have raised important debates. This article delves into AI's diagnostic potential and the dilemmas that define it as either a revolutionary tool or a rising threat.

Human-AI Partnership

Although AI has proven effective in diagnostics, it's unlikely to fully replace doctors. Instead, the most promising approach is not replacement but collaboration. AI can process and analyze vast quantities of patient data in seconds, while physicians offer empathy, intuition, and context-sensitive judgment. Studies suggest that diagnostic accuracy improves when physicians and AI systems work together. This collaboration shows that the future of medical diagnosis lies not in choosing between human or machine, but in combining their strengths.

For example:

- Precision/Personalized Medicine aims to use an individual's genetic make-up to determine the correct choice and dose of treatment. ¹

- Radiomics is a quantitative medical imaging tool capable of extracting key information that is imperceptible to the human eye. By using efficient data extraction and mathematical analysis, radiomics attempts to quantify image intensity, shape, or texture which can be correlated with a specific clinical attribute. ²
- In another study, scientists compared clinical judgment with the MySurgeryRisk algorithm for preoperative risk assessment; the authors reported the performance of this algorithm was significantly better than that of physicians who were making initial risk assessments. ³

Applications of AI in Healthcare

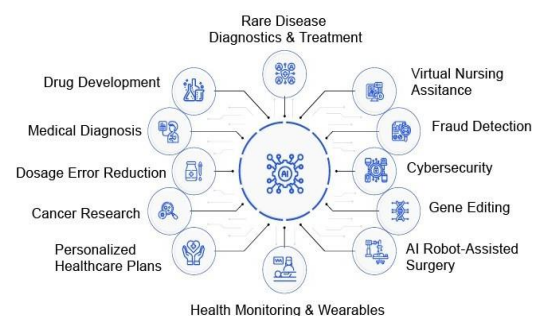


Figure 1: Applications of AI in healthcare. ⁹

AI In Rare Disease Detection

Identifying rare diseases has always posed a significant challenge in medicine. With symptoms that often overlap with common conditions and lack of awareness, patients go years without an accurate diagnosis.

AI systems are capable of sifting through massive volumes of patient data; medical histories, lab reports and spotting subtle hints or patterns that may point towards a rare condition. These patterns can be overlooked by the human eye especially in busy clinical settings.

AI has helped in:

- Early detection and diagnosis of coronavirus disease 2019 (COVID-19) through monitoring of demographic, clinical, and epidemiological characteristics of patients.⁴
- High-throughput screening campaigns can then generate large amounts of data, leading to the discovery of drugs such as riluzole for the treatment of amyotrophic lateral sclerosis⁵

Implications And Accountability

As AI becomes more involved in clinical decisions, especially in diagnosis, it raises serious concerns about responsibility. If an AI system makes an incorrect diagnosis, who is held accountable—the doctor or the developer? Another rising issue is that if doctors rely heavily on AI suggestions, they could potentially weaken their own decision-making skills. Additionally, AI systems are only as reliable as the data they are trained on. If the data is biased or limited, the AI might produce inaccurate or harmful results. Responsible data handling practices, including decentralized data sharing, are critical to preserve patient privacy. Algorithmic bias poses a significant challenge, demanding diverse datasets and ongoing monitoring to ensure fairness. Transparency and explainability in AI decision-making processes enhance trust and accountability.⁶ At the end of the day, AI should support, not replace human judgment and clear guidelines are needed to ensure safe and ethical use in medicine.

Current Challenges

Artificial Intelligence's rising role in healthcare also brings attention towards the challenges faced integrate it properly to play a more crucial role. Here are some of the key challenges:

- **Data Privacy And Security**

Healthcare data is highly sensitive and improper storage and use of it raises great privacy concerns. In 2024 alone, healthcare

breaches affected over 190 million individuals.⁷

- **Workforce Training And Digital Literacy**

To implement AI on a larger scale in healthcare it is necessary to ensure digital literacy among healthcare professionals.⁸

- **Standardization of Data**

A standardized data format that is harmonious across various AI systems could play a vital role in speeding up the adoption of AI systems.

- **Technological Infrastructure**

Lack of proper infrastructure to support IT development causes hindrance in the development of AI systems or technological advancements in general.

Conclusion

Although AI has made rapid progress in healthcare, ethical concerns regarding its usage and lack of accountability have repeatedly raised grave concerns. Data breaches and a lack of properly trained professionals pose a major concern in adapting AI. Despite all the caveats, AI can still be used for precise and informed decision making, and in some cases it has even outperformed humans. With lives at stake, however, AI can still not be solely relied on for diagnosis and treatment, but it certainly has the potential to create a more personalized and equitable healthcare system.

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