The Game Unfolding: Artificial Intelligence in Healthcare - Hype or Gamechanger?

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Editorial

As a physician witnessing the relentless evolution of healthcare over the last few decades, a question dominates: is the buzz surrounding artificial intelligence (AI) merely a fleeting hype, or is it poised to become a true game-changer? While AI as a concept has existed since the 1950s, all AI is not the same. Capabilities and risks of various kinds of AI differ markedly, and Howell et al [1] have elegantly described the 3 epochs of AI in healthcare. AI 1.0 which has been there since the 1950s included symbolic AI, which attempted to encode human knowledge into computational rules, as well as probabilistic models. In health care, tools such as INTERNIST-I tried to represent expert knowledge about diseases to help us diagnose and treat challenging cases [2].

The most important issue was that symbolic AI had inherent, fundamental capability limitations and appeared to be brittle when confronted with real-world situations in the clinics. In response, research began focusing more on probabilistic modelling, such as traditional regression models and then Bayesian networks, which allowed both the expert knowledge and empirical data generated, to contribute to reasoning systems [3]. The era of AI 2.0 began with “deep learning”, in which models learned from examples labelled with ground truth. As datasets grew and computers sped up, deep learning with multilayered neural networks came into its own.

Deep learning also made new things practical in health care. One of JAMA’s most influential articles of the decade showed the identification of diabetic retinopathy in retinal photographs which matched the competence of the ophthalmologists [5]. Researchers also demonstrated breakthroughs in breast [6] and lung cancer [7] screening, pathology [8], identification of skin lesions [9], and predictions from electronic health record data [10], among many other areas.

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AI 3.0 is the era of foundation models and generative AI like ChatGpt, Bard, Llama etc. Models in AI 3.0 have fundamentally new (and potentially transformative) capabilities, as well as add new kinds of risks, such as hallucinations. These models can do many different kinds of tasks without being retrained on a new dataset. Large Language Models (LLMs) are already impacting our daily lives, in writing assistants, image generators, software-coding assistants, and chatbots. Health-specific LLMs like Med-PaLM and Med-PaLM 2 are medically tuned foundation models, that have reached expert-level performance on medical licensing examination–style questions [11-12].

While predictions paint a future riddled with AI-powered robots performing surgery and algorithms diagnosing diseases with superhuman accuracy, the current reality presents a more nuanced picture.

On the one hand, AI’s potential to transform healthcare is undeniable. Its ability to analyze vast amounts of medical data, previously unimaginable by human minds, opens doors to:

- Early disease detection: AI algorithms, trained on medical images and patient records, can outperform human radiologists in identifying early signs of cancer [13], heart disease [14], and other illnesses. This translates to timely interventions, potentially saving lives and improving prognosis. Personalized medicine: By analyzing individual genetic and clinical data, AI can tailor treatment plans to each patient’s unique needs, maximizing its effectiveness while minimizing side effects [15].
- Drug discovery and development: AI can accelerate the arduous process of drug discovery by analyzing vast molecular databases and predicting potential drug candidates. This can significantly reduce the time and cost associated with bringing new life-saving medications to patients [16].
- Enhanced clinical decision-making: AI-powered tools can assist doctors by analyzing complex medical data and presenting insights alongside relevant guidelines, aiding in diagnosis, treatment selection, and risk assessment. This empowers doctors to make more informed decisions, potentially leading to improved patient outcomes [17].

These advancements paint a promising picture, but the road to implementation is paved with challenges. The overhyped expectations surrounding AI can create unrealistic and potentially dangerous scenarios. Here are some critical considerations:

- Data quality and bias: AI algorithms are only as good as the data they are trained on. Biased or incomplete data can lead to biased and inaccurate AI outputs, potentially exacerbating existing healthcare disparities. Addressing data quality and mitigating bias is crucial for responsible AI development [18-19].
- Interpretability and trust: The "black box" nature of some AI algorithms can make it difficult for doctors to understand how a decision was reached, limiting their trust and hindering adoption. Explainable AI approaches are necessary to build trust and ensure patient safety [20-21].
- Ethical considerations: The integration of AI into healthcare raises critical ethical questions regarding data privacy, informed consent, and potential job displacement. Addressing these concerns through robust ethical
frameworks and transparent communication is essential to ensure social responsibility and public acceptance [22-23].

- Accessibility and affordability: The cost of developing and implementing AI solutions can be significant, creating an access barrier for resource-limited healthcare systems. Ensuring equitable access to this technology requires creative solutions and collaborative efforts [24-25].

Therefore, rather than viewing AI as a replacement for human expertise, we must envision it as a powerful tool that complements and amplifies the capabilities of healthcare professionals. The true game-changer lies in the collaborative synergy between human intuition and AI-driven insights.

In conclusion, while the hype surrounding AI in healthcare may be exaggerated, its potential to revolutionize the field is undeniable. By addressing the challenges outlined above and forging ethical and responsible paths forward, we can unlock the true potential of AI to transform healthcare into a more personalized, data-driven, and ultimately, life-saving endeavour. We surely have to acknowledge the promise of AI for health care, but also should realize that developers must work with physicians to ensure that any AI healthcare system helps clinicians deliver better, more equitable humanistic care, not just more accurate, scientific care.[26] The game is unfolding, and our decisions today will determine whether it ends in triumph or a cautionary tale [27].

References: