Letter to the Editor

Devil's advocate: exploring the potential negative impacts of artificial intelligence on the field of surgery

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Received: 11 November 2023; Accepted: 30 January 2024; Published online: 15 March 2024.
doi: 10.21037/jmai-23-158
View this article at: https://dx.doi.org/10.21037/jmai-23-158

Artificial intelligence (AI) was first described in 1956 as the use of computer technology to simulate the critical thinking of human beings. After an apparent lull in the technology, we are now in an era of rapid advancements in AI which has potential to revolutionize the healthcare industry in ways never imagined in human history. In the field of surgery, AI has shown immense promise in improving diagnostic accuracy, surgical precision, and patient outcomes (1,2). However, in addition to the well-advertised grandiose benefits, one must ensure that AI does not veil a dark underbelly of potentially negative side-effects beyond what has previously been suggested (3). It is crucial for surgeons, policymakers, and healthcare professionals to be reminded of—and proactively address—challenges such as the risk of overreliance, ethical considerations, potential job displacement, and the need for continued human expertise, to assert responsible integration into surgical practice.

A primary concern regarding the use of AI in surgery is the risk of overreliance on these systems. Sophistication of AI algorithms is increasing at an impressively exponential rate, which inevitably decreases the need for skilled human judgement and decision-making. For example, SurgicalGPT builds on the large language model of the well-known ChatGPT to incorporate visual processing. This has outperformed other state-of-the-art models, and accurately answers visual questions during robotic procedures (4). As this fusion of vision-language models continues to develop, there may be a temptation to blindly follow AI recommendations or conclusions without critically evaluating the clinical context and patient-specific factors (5). Surgical training and future generations of surgeons may suffer at the loss of valuable mentorship experience which underpins current pedagogy. Impressively, OpenPath utilized over 200,000 medical images on Twitter to demonstrate the ease of AI in enhancing the diagnosis and education of pathology, resulting in a reduced reliance on mentorship (6). The supreme mantra that "Surgery is an Art" is at risk of becoming a page in textbooks of surgical history.

Secondly, the integration of AI in surgery raises significant ethical considerations that must be addressed (7). There must be transparency and accountability in AI algorithms used for surgical decision-making. Who will assume the responsibility of indemnifying machine decisions? Surgeons and patients are entitled to access evidence regarding the development, validation, and inherent limitations of AI systems to ensure informed decision-making. Additionally, issues such as patient consent, privacy, and data security become paramount when utilizing AI algorithms that require access to sensitive patient data. The potential for demographic or socioeconomic bias in these algorithms must also be carefully monitored and mitigated to avoid inequity in delivery of personalized patient care.

Thirdly, concerns have also been raised about the potential job displacement not only among surgeons but across the entire healthcare industry. The assistance of

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AI with tasks traditionally performed by surgeons may gradually progress to complete automation, reducing the need for any human, let alone one who has dedicated over a decade towards developing their craft (8). The ripple effect progresses to the job market, reduced training pathway opportunities, and re-evaluation of training programs to incorporate skills in collaborating with AI systems. For example, augmented reality can be used in surgical training to seamlessly overlay computer-generated images onto a surgical field, benefiting technical proficiency and cultivating muscle memory (9). If there is a decrease in demand for certain surgical specialties, it naturally follows that surgical education, training and personal development must also be considered and prioritized to avoid over-supply. It is challenging to predict the complex balance between preservation of human expertise in surgical practice which includes perioperative management, and the limitless potential of future machine intelligence. The question becomes how much can we leverage the technology as a tool to improve our capabilities, rather than replace them?

Finally, it may be argued that addressing these, and other unknown, potential negative impacts to our field of surgery is a matter of self-preservation. The development of AI algorithms should be subject to rigorous regulatory frameworks to ensure safety, transparency, and accountability. National and international governing bodies of surgery must collaborate with ethicists, data scientists and the patients we serve to establish guidelines and standards for integration of AI into surgical practice (10). An emphasis on patient-centered care may mitigate some of these negative impacts, by promoting the importance of patient values and preferences which require (for now) human expertise.

Integration of AI into the art of surgery holds tremendous potential for improving precision, accuracy, and ultimately surgical outcomes. It is however of utmost significance to acknowledge the risk of overreliance, address ethical considerations, mitigate job displacement, and emphasize the importance of maintaining human expertise in the present, to ensure surgeons and healthcare professionals can maintain responsible control of AI technology in the future.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was a standard submission to the journal. The article has undergone external peer review.

Peer Review File: Available at https://jmai.amegroups.com/article/view/10.21037/jmai-23-158/prf

Conflicts of Interest: The author has completed the ICMJE uniform disclosure form (available at https://jmai.amegroups.com/article/view/10.21037/jmai-23-158/coif). The author has no conflicts of interest to declare.

Ethical Statement: The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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doi: 10.21037/jmai-23-158
Cite this article as: Sarofim M. Devil's advocate: exploring the potential negative impacts of artificial intelligence on the field of surgery. J Med Artif Intell 2024;7:7.