

Artificial intelligence (AI) and ChatGPT involvement in orthopaedic research activities, the good, the bad, and the Ugly

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“Scientific writing is a mandatory skill for most researchers, and orthopaedic surgeons are no exception. However, improvement of the writing quality could be achieved using some assistive tools. The most recent ones involve using artificial intelligence (AI), specifically ChatGPT. Although it seems appealing for improving scientific writing and assisting non-native English speakers, its usage is still not well regulated, and ethical issues were raised regarding the misuse of these tools in the scientific research and writing process. Strict regulations controlling the involvement of these tools are still needed, and their judicious and honest utilization is mainly dependent on the researchers themselves.”

Keywords:

ChatGPT, artificial intelligence, research activities, scientific writing

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Introduction

Starting with ideas presented in science fiction movies until it became a reality a few years back, artificial intelligence (AI) is now involved in nearly every aspect of our daily life, including medical practices and scientific research activities [1,2]. However, a considerable turn took place after the introduction of the Generative Pretrained Transformer ‘ChatGPT’ in November 2022 (OpenAI, San Francisco, CA, USA), which is an open AI platform processed through deep learning that enables it to perform simple to highly sophisticated tasks, such as writing poetry, language translation, explaining quantum mechanics, responding to various queries by accessing internet sources, and being able to process all steps of research article production [3–5].

AI applications and ChatGPT, in particular, rapidly found their way to be involved in all aspects of scientific research, from data collection and analysis to the formulation of the final manuscript, which draws the attention of researchers with no expectation of orthopaedic surgeons regarding the soundness, fairness, ethical aspects, and drawbacks of AI or ChatGPT involvement in scientific research cycle [6].

Although there are no clear roles yet in controlling and organizing the role of AI or ChatGPT in scientific research, most of the journals introduced a statement in their authors’ instructions obligating authors to declare or acknowledge the use of AI or ChatGPT in the process of their manuscript preparation, some journals or editors took it to the extremities, where some allowed ChatGPT to be listed as a leading author [5], and others banned its authorship role with

a recommendation that authors must describe its role in detail within the methods section [6,7].

However, we believe that a final judgment on AI or ChatGPT involvement in the scientific research process is premature; however, our role is to separate the wheat from the chaff and to allude to some of the good, the bad, and the ugly aspects of using these new applications in scientific writing.

The Good: AI-based writing assisting tools such as SciNote Manuscript Writer or Writefull, which helps with the writing process itself, or such as Grammarly, which assists in language correction and improvement, have been present for a considerable time and have been used by many researchers [8]. Although ChatGPT’s involvement in scientific writing occurred since a relatively short period, it revolutionized the process.

First, it fastened the research and writing process by being involved in literature search, data analysis, collecting relative evidence, and manuscript formulation into its different sections [9]. Second, it helped save researchers time, being able to analyze thousands of published articles and collecting evidence from them instead of performing this process manually [10]. Third, it would be a helpful tool while preparing review articles, as this model could be trained on a specific topic, enabling it to search and collect all relevant articles; furthermore,

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it could summarize the articles and extract the essential findings [10]. Fourth, it could be involved in multiple aspects of language editing, starting from translation, grammatical corrections, paraphrasing, and correcting spelling errors, which could benefit non-English-speaking researchers [8,10].

The Bad: Although some promising and valuable implications of AI or ChatGPT were mentioned, it is not immune to drawbacks, which necessitates the involvement of human researchers for reviewing and ensuring the process's soundness.

First, some authors reported the inability of AI or ChatGPT to provide sufficiently higher evidence levels besides providing wrong, non-existing, or even fabricated references, raising concerns regarding these applications' ability to independently generate sound scientific content [11]. Second, as we mentioned, these applications could be trained on a specific subject to help collect the related evidence; this could be a source of biased results as if the model was trained on biased data, it will only produce biased results [10]. Third, suppose a researcher would rely on AI or ChatGPT for most of the research and writing process. In that case, this will mainly affect the researcher's critical thinking ability and creativity [10]. Fourth, a plagiarized text could be produced if these applications generated text similar to what is already published [12].

The Ugly: Apart from the drawbacks mentioned earlier, some unacceptable behaviors, although not proven yet, raised significant concerns among researchers.

First, one major fear is the production of fabricated and fraudulent articles which appears to be authentic and genuine; although fabrication is a well-known phenomenon in scientific research, however, fabricated data or manuscripts assisted by AI and ChatGPT could be challenging to be identified by human reviewers; furthermore, the available AI detection tools are not so accurate in determining the AI-generated text [4,13]. Second, AI and ChatGPT showed an ability to produce scientific abstracts even in the absence of correct data, which convinced human reviewers to be true and sound; this raises some ethical concerns, mainly when these abstracts are submitted for scientific conferences without actual supporting data; furthermore, these tools could be used by paper mills to produce vast amounts of abstracts and falsify the research contents [8].

In conclusion, it is evident that AI and ChatGPT are just a start for more coming applications and tools to be involved in the whole research process, including

data gathering, processing, analysis, and introducing it as soundly written manuscripts. So, orthopaedic surgeons and researchers have to deal with the fact that these applications are here to stay, and the role of each individual researcher is to make the best use of them honestly and ethically. From the journal editors' and reviewers' side, authors' instructions must be modified so that authors are urged to acknowledge and declare if they used AI or ChatGPT during any step while preparing their manuscript; furthermore, AI detection tools should be used to evaluate suspected submitted manuscripts, and robust regulations should be developed to ensure even and fair chances for all researchers, the one who adapted these tools and who did not.

Finally, the role of human researchers, editors, peer-reviewers, and authors will still be mandatory throughout scientific article production. However, it is possible in the near future to experience journals entirely operated by AI-based platforms.

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Ethical approval

Not applicable.

Study setting

Arthroplasty unit, Orthopaedic department, Assiut University Hospital, Assiut, Egypt.

Conflicts of interest

The authors declare no conflict of interest.

References

- 1 Secinaro S, Calandra D, Secinaro A, Muthurangu V, Biancone P. The role of artificial intelligence in healthcare: a structured literature review. *BMC Med Inform Decis Mak* 2021; 21:125. 2021/04/10. doi:10.1186/s12911-021-01488-9
- 2 Basu K, Sinha R, Ong A, Basu T. Artificial intelligence: How is it changing medical sciences and its future?. *Indian J Dermatol* 2020; 65:365–370. doi:10.4103/ijid.IJD_421_20
- 3 Kunze KN, Jang SJ, Fullerton MA, Vigdorichik JM, Haddad FS. What's all the chatter about?. *Bone Joint J* 2023; 105-B:587–589. doi:10.1302/0301-620x.105b6.Bjj-2023-0156
- 4 Liebrezn M, Schleifer R, Buadze A, Bhugra D, Smith A. Generating scholarly content with ChatGPT: ethical challenges for medical publishing. *Lancet Digit Health* 2023; 5:e105–e106. doi:10.1016/s2589-7500(23)00019-5
- 5 O'Connor S. ChatGpt. Open artificial intelligence platforms in nursing education: Tools for academic progress or abuse?. *Nurse Educ Pract* 2023; 66:103537. 2023/01/01/. doi:https://doi.org/10.1016/j.nepr.2022.103537

- 6 Leopold SS, Haddad FS, Sandell LJ, Swiontkowski M. Artificial intelligence applications and scholarly publication in orthopedic surgery. *J Orthop Res* 2023; 41:1137–1138. doi:10.1002/jor.25566
- 7 Stokel-Walker C. ChatGPT listed as author on research papers: many scientists disapprove. *Nature* 2023; 613:620–621. doi:10.1038/d41586-023-00107-z
- 8 Gao CA, Howard FM, Markov NS, Dyer EC, Ramesh S, Luo Y, Pearson AT. Comparing scientific abstracts generated by ChatGPT to real abstracts with detectors and blinded human reviewers. *NPJ Digit Med* 2023; 6:75. doi:10.1038/s41746-023-00819-6
- 9 Mojadeddi ZM, Rosenberg J. The impact of AI and ChatGPT on research reporting. *N Z Med J* 2023; 136:60–64.
- 10 Marchandot B, Matsushita K, Carmona A, Trimaille A, Morel O. ChatGPT: the next frontier in academic writing for cardiologists or a Pandora's box of ethical dilemmas. *Eur Heart J Open* 2023; 3:oead007. doi:10.1093/ehjopen/oead007
- 11 Seth I, Sinkjær Kenney P, Bulloch G, Hunter-Smith DJ, Bo Thomsen J, Rozen WM. Artificial or augmented authorship? A conversation with a chatbot on base of thumb arthritis. *Plast Reconstr Surg Glob Open* 2023; 11:e4999. doi:10.1097/gox.0000000000004999
- 12 Else H. Abstracts written by ChatGPT fool scientists. *Nature* 2023; 613:423. doi:10.1038/d41586-023-00056-7
- 13 Májovský M, Černý M, Kasal M, Komarc M, Netuka D. Artificial intelligence can generate fraudulent but authentic-looking scientific medical articles: Pandora's box has been opened. *J Med Internet Res* 2023; 25:e46924. doi:10.2196/46924