



Navigating Artificial Intelligence in Scientific Manuscript Writing: Tips and Traps

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Indian J Radiol Imaging 2025;35(Suppl S1):S178–S186.

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Abstract

It is being increasingly recognized that the strategic use of artificial intelligence (AI) can catalyze the process of manuscript writing. However, it is imperative that we recognize the hidden biases, pitfalls, and disadvantages of relying solely on AI, such as accuracy concerns and the potential erosion of nuanced human insight. With an emphasis on crafting effective prompts and inputs, this article reveals how to navigate the labyrinth of AI capabilities to create a good-quality manuscript. It also addresses the evolving guidelines from various publishers, shedding light on how to “leverage the digital genie” responsibly and ethically. We further explore how and which AI tools can be harnessed for literature reviews, executing statistical analyses, and polishing the language of the manuscript. Providing practical strategies for maximizing AI’s benefits, this article underscores the indispensable value of human creativity and critical thinking, stressing that while AI can “streamline the mundane,” the author’s insight remains vital for profound intellectual contributions.

Keywords

- ▶ artificial intelligence
- ▶ generative AI
- ▶ large language model
- ▶ manuscript
- ▶ scientific manuscript

Introduction

The composition of an original manuscript for radiological and other medical journals constitutes merely the culmination of an extensive and intricate process. Prior to the actual drafting of the manuscript, various stages must be meticulously executed, that is, literature review on the relevant topic, formulation of the experimental hypothesis and the research question, appropriate design of the study, calculation of the requisite sample size, securing approval from the ethics committee, recruitment of participants (obtaining informed consent) and execution of the study protocol, data acquisition and its rigorous statistical analysis, and finally drafting of the interpretation of the analysis and its potential usefulness in generation of a scientific evidence.

The art of manuscript writing transcends mere transcription of the scientific findings; it requires a mix of creative

ingenuity and meticulous, detail-oriented labor. The act of scientific manuscript writing demands not only the imaginative skill to conceptualize complex ideas but also attention to precision and accuracy. This duality ensures that the narrative is both intellectually stimulating and meticulously substantiated. Hence, the key to use artificial intelligence (AI) effectively and meaningfully, while writing a manuscript, is to use it in augmenting the rigors of investigation while cautiously impeding the infringement of AI into the steps requiring creative nuances provided by the human authors, also known as “the human touch.” A provocative quote by Pablo Picasso, “Computers are useless. They can only give you answers,” underpins the inherent limitations of AI in generating novel insights and fostering intellectual creativity. A pernicious drawback of generative AI is **hallucination**, wherein it fabricates information that appears plausible but is entirely fictitious.¹ Another critical concern is **AI drift**,

DOI <https://doi.org/10.1055/s-0044-1800801>.
ISSN 0971-3026.

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the gradual deviation of AI-generated content from the intended topic or style over time.² AI's propensity for providing inadequate or nonexistent references necessitates meticulous fact-checking by human authors. Finally, the **risk of plagiarism** is significantly heightened with AI-generated content.³

Through a comprehensive examination of AI's applications in literature review, statistical analysis, data management, and manuscript writing, this article aims to provide a cogent overview of how AI should be utilized in manuscript writing. The dos and the don'ts discussed will serve as a practical guideline for the readers to augment the symbiotic relationship between the nuanced critical thinking of the authors and the multifaceted ability of AI to bestow an invaluable gift of time so that the researcher is able to allocate more effort for intellectually stimulating aspects of scientific manuscript writing.

This review employs a narrative integrative methodology to appraise existing literature on AI tools relevant in the field of manuscript writing. The goal is to evaluate the capabilities, strengths, and limitations of various AI tools, offering a comprehensive overview for researchers and practitioners. A systematic search was performed across databases such as PubMed and Google Scholar, using specific keywords. The inclusion criteria included studies that evaluate or discuss AI tools, published in peer-reviewed journals, and providing empirical data, while duplicates were excluded. The synthesized data reveal key themes and trends in the AI landscape and its ethical use in research.

AI and Large Language Models

AI: The overarching field involving intelligent systems and technologies. Example: autonomous vehicles (e.g., Tesla's Autopilot).

- Machine learning (ML): A subset of AI focused on learning from data and improving performance over time. Example: e-mail spam filters.
 - Neural networks (NNs): A subset of ML that uses algorithms inspired by the brain to recognize patterns. Example: image recognition systems (e.g., Google Photos).
 - Deep learning (DL): A subset of NNs with multiple layers for learning complex patterns. Example: voice assistants (e.g., Apple's Siri).
 - Generative AI: A type of DL that generates new content from learned data. Example: AI-generated art (e.g., DALL-E by OpenAI).
 - Natural language processing (NLP): Broad field within AI that focuses on the interaction between computers and human language, for example, Google Translate.
 - Large language models (LLMs): A subset of NLP and generative AI that focuses on understanding and generating human language. Example: Chatbots (e.g., ChatGPT by OpenAI, Microsoft, Copilot).
 - Symbolic AI: Traditional AI that relies on rules and logic to simulate human reasoning. Example: rule-based diagnostic systems in health care.
- Expert systems: A type of symbolic AI that mimics the decision-making of human experts in specific fields. Example: MYCIN, an early expert system for medical diagnosis.
 - Knowledge-based systems: Systems that use extensive domain-specific knowledge to perform tasks. Example: IBM Watson.

► **Fig. 1** depicts the hierarchies related to AI. The figure was generated by an AI tool, Julius AI.⁴

Review of Literature

A robust literature review forms the basis of any scholarly inquiry and is defined as a “systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing the extant corpus of completed and documented work by researchers, scholars, and practitioners”⁵ It facilitates a comprehensive understanding of existing knowledge, identifies lacunae in the available research, and guides about the research methodology to be pursued.

There are several suggested steps to perform literature review consisting of the following: identifying the purpose of review, source selection, choosing search terms, running the search, screening of the search and the quality appraisal, and finally synthesizing the results of the review. The sources of literature search can be various indexes (PubMed, IndMED, Embase), journal collections (Medknow, DOAJ), clinical trials (CTRI, EU clinical trials registry), and systematic review (Cochrane library). Traditionally, the search should be done using the Boolean operators (AND, OR, and NOT) while combining them with the specific keywords within parenthesis and quotation marks.⁶

- NLP tools, such as **ChatGPT and Copilot**, possess the remarkable ability to distill vast quantities of text into succinct summaries. Theoretically, this proficiency should permit the researchers to swiftly discern the essential insights of numerous papers, thereby obviating the need for exhaustive perusal. In practice, however, the generated contents often exhibit a proclivity for repetitiveness, redundantly presenting similar information. Also, generative AI fails to capture the nuanced intricacies inherent in scholarly studies. For example, on giving a prompt “Role of Diffusion Tensor Imaging (DTI) in Hypoxic-Ischemic Encephalopathy (HIE),” ChatGPT enlists five studies (2012 to 2016). While these results are accurate and appropriately summarized, the literature is repetitive, relatively non-recent, and lacks several points worthy of exploration in these scholarly articles. Compounding these issues is the phenomenon of *hallucination* and lack of proper referencing.¹ A review of recent studies reveals 66% of the reviewed cases included fabricated or bogus papers. Manual verification further revealed that many references supplied by ChatGPT were outdated or fictional, highlighting the importance of thorough validation and caution when relying on AI-generated content for writing a manuscript.⁷

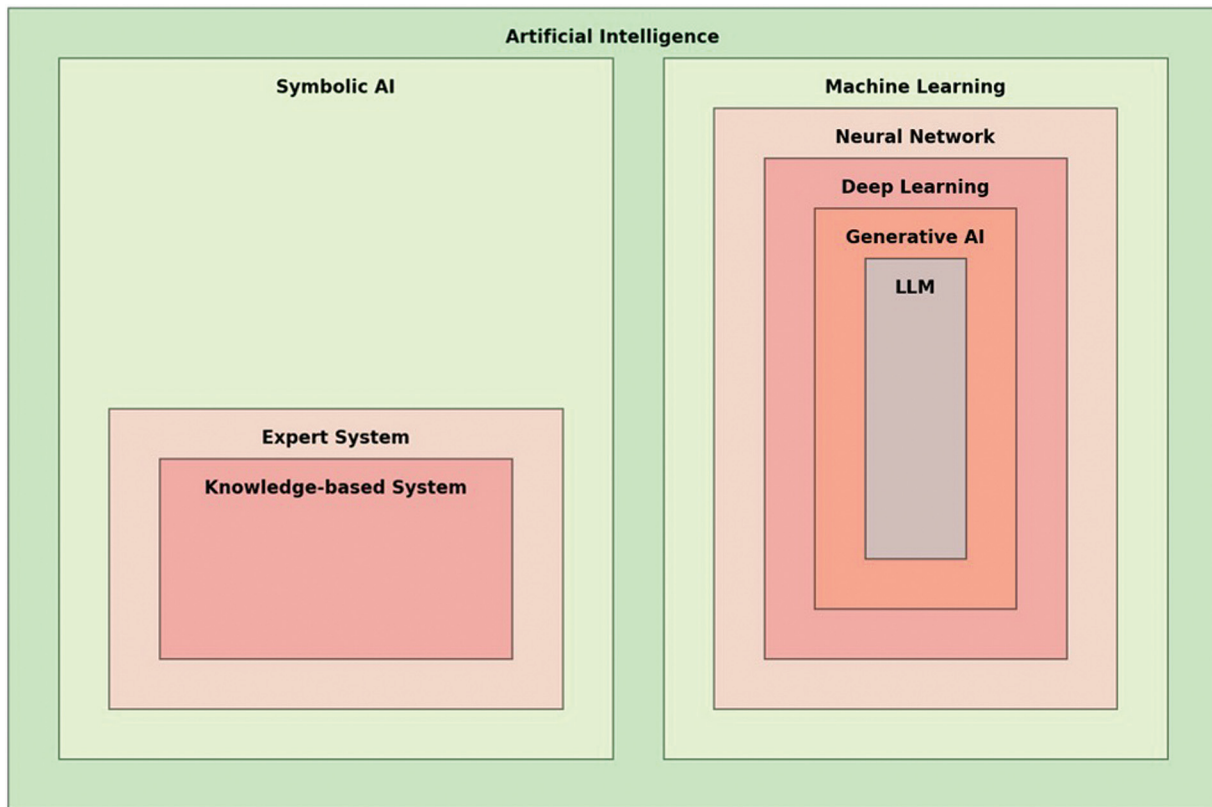


Fig. 1 Diagram illustrating the artificial intelligence (AI) related hierarchies, generated using Julius AI (Version 3.0). LLM, large language model.

- **Scopus AI:** It is an intuitive generative AI tool devised by Elsevier that uses NLP so that a search can be done using the English language rather than Boolean operators. It draws only peer-reviewed contents from the articles that are indexed on Scopus and only those published after 2003 are considered. Additionally, there are options such as expanded summary, concept map, foundational documents menu, and topic experts. A study by Mozelius et al⁸ found the option of foundational papers particularly impactful in extracting the seminal works and pointing toward the source of any idea using Scopus' citation graph technology.
- **Elicit:** It uses GPT-4 to automate parts of the workflow for literature review searching. When asked a research question, it lists the most relevant papers in the tabular format and can summarize various parameters related to the study as columns such as summary, methodology, interventions, outcomes, summary of discussion, and other parameters (total 34 parameters). Elicit is limited to publications in Semantic Scholar.⁸
- Other resources for literature search are ResearchRabbit (citation-based literature mapping tool), SciteAi (provides citation context for scientific papers, helping researchers evaluate the credibility and impact of scholarly articles), Keenious, etc.

Study Design and Methodology

- **Data collection, entry, and management:** A variety of AI tools have been specifically developed to enhance the

efficiency of data analysis, including platforms such as Julius.AI and Unriddle.AI, IBM Watson, Alteryx, among others. Additionally, AI chatbots can be employed to facilitate the collection of follow-up data from patients, thereby addressing a significant drawback in evidence-based radiology: the insufficient inclusion of patient values in the decision-making and evaluation processes.

- **Study subjects:** AI algorithms can help determine optimal sample sizes by analyzing past studies and predicting the necessary statistical power. AI tools might offer differing recommendations, leading to potential inaccuracies. Thus, it is advisable to use statistical formulas or consult a statistician. For instance, AI tools gave different recommendations for a study on the role of magnetic resonance imaging (MRI) in assessing Placenta Accreta Spectrum: Chat GPT suggested 150 to 200 participants, while Copilot recommended at least 8 patients.^{9,10}
- **Data extraction:** AI algorithms meticulously parse through vast amounts of imaging data, identifying and extracting pertinent information with precision.¹¹ Fink et al compared ChatGPT and GPT-4 in analyzing 424 computed tomography (CT) reports of lung cancer follow-up scans.¹² ChatGPT showed average performance in extracting lesion parameters (67%), identifying metastatic disease (90%), and correctly labeling oncologic progression (F1 score of 0.91). GPT-4 performed significantly better but was not entirely accurate. In another study by Guellec et al, Vicuna, an open-source LLM, analyzed 2,398 brain MRI reports in French from patients with

headaches.¹³ Vicuna demonstrated high accuracy in identifying normal or abnormal studies (96% sensitivity and 99% specificity) but had lower accuracy in identifying MRI findings leading to headaches (88% sensitivity and 73% specificity). Various LLMs have been used for extracting information from radiology reports. Initially, recurrent neural network (RNN) based models like ELMo were considered; however, with advancements in transformer-based models, several new approaches emerged:

- **Encoder-based models** like BERT (2018) became popular for their ability to understand context in text.
- **Decoder-based models** such as GPT-3 (2020) and GPT-4 (2023) focused on generating coherent text.
- **Models combining both encoder and decoder blocks**, like Megatron-LM (2019), offered enhanced capabilities by leveraging the strengths of both architectures.

A study by Hu et al explored ChatGPT's ability to extract information from 847 CT reports of lung cancer.¹⁴ Good performance was demonstrated in extracting tumor location and dimensions (long and short diameters). When prior medical knowledge was incorporated into the prompt, significant improvements were observed in extracting details about tumor spiculations, lobulations, and pleural invasion or indentation. However, tasks related to tumor density and lymph node status did not show better performance. The authors suggested that ChatGPT was less effective compared with BERT-based multiturn question-answering approach.¹⁴

Statistical Analysis

Various AI tools have been developed that can aid in data analysis. AI tools like ChatGPT, Julius AI, IBM Watson Studio, Google Cloud AI Platform, and Microsoft Azure Machine Learning can identify whether data are categorical or continuous and recommend appropriate statistical tests.¹⁵ They can also check if data meet the assumptions required for specific tests, such as normal distribution for *t*-tests and analysis of variance (ANOVA), and suggest alternative approaches if assumptions are violated. For example, they might recommend Welch's ANOVA if homogeneity of variance is not met or nonparametric tests like the Mann-Whitney *U* test if normality is not achieved. Additionally, AI tools can generate various data visualizations, automating the creation and customization of charts and graphs, which is particularly useful for large datasets. This automation allows researchers to focus more on interpreting their data rather than on the technical details of visualization. Each AI tool has its unique strengths and weaknesses. The choice of tool should align with the specific needs and resources of the user.

- **ChatGPT** is versatile and user friendly but may lack precision in statistical tasks. It can generate basic text-based descriptions of data but lacks advanced visualization tools. While it can process information, its strength lies in language generation, not deep data analysis.¹⁶

- **Julius AI** offers several useful features for researchers even without a deep background in data science. It has a workspace-like interface designed for data analysis with a clear focus on data visualization (charts, graphs, and others). It integrates with popular data tools and platforms such as Excel, CSV files, PDF, text files, and Google sheets. It can run statistical analyses, suggest next steps, and answer questions about the analyses.¹⁷
- Tools such as **Hugging Face or Dataiku** can be used to analyze large-scale data, and they provide a comprehensive toolkit for data handling. However, they can be complex and costly and may require training.

Practical step-by-step guide to conduct statistical analysis using ChatGPT or Julius AI^{17,18}:

- Step 1: Upload the dataset.
- Step 2: Define the requirements.

Suggested prompts:

- Data cleaning:
 - “Clean the data by removing duplicates, highlighting missing values, and performing other necessary tasks. Please provide a summary of the actions taken once completed.”
 - “Identify any quality issues, such as spelling mistakes in the Excel sheet.”
 - “Apply capping to mitigate the impact of extreme values while preserving data integrity.”
- *Summary statistics*: “Generate summary statistics for the dataset, including measures such as mean, median, and range.”
- *Data visualization*: “Create a histogram to visualize the data.”
- Step 3: Request recommendations. Julius AI provides automated recommendations based on the data structure.
 - *Visualization suggestions*: “Generate two different plots for the data and explain the rationale behind choosing these visualizations.”
 - *Statistical analysis recommendations*: “Recommend statistical analyses to understand the impact of MRI findings on the diagnosis of periampullary carcinoma.”
 - *Plot-specific analysis*: Julius AI provides multiple options for visualization such as scatter, box plot, histogram, pair plot, and heatmap.
- Step 4: Interpreting results:
 - *Prompt*: “I have conducted a [specific test]; the result is [result]. What does this data indicate?”
 - *Multiple regression analysis*: “Provide the results of the multiple regression analysis and explain the coefficients.”

Authorship and Other Ethical Quagmires

The use of AI in medical research presents several ethical dilemmas, including issues related to bias, informed consent, accountability, and transparency.¹⁹ AI systems can exhibit bias because they are trained on specific datasets, which

might distort citation practices and favor certain viewpoints. Additionally, the decision-making processes of AI are often unclear and difficult to interpret, leading to a “black box” effect that can undermine trust between AI systems and health care professionals.²⁰ This situation raises concerns about who is responsible for errors and how legal responsibilities should be defined for developers and users of these technologies. Informed consent becomes more challenging with AI, as patients need to be fully aware of the potential risks and benefits of participating in research. The extensive use of data by AI also brings up concerns about data ownership and privacy. In a recent legal case, i.e., *Dinerstein v. Google and Project Nightingale and Ascension*, it was alleged that the University of Chicago shared medical records with Google containing enough information that enabled Google to potentially re-identify patients, violating HIPPA (Health Insurance Portability and Accountability Act) compliance.^{21,22}

Ethical guidelines for AI systems like ChatGPT have been set by organizations such as the European Union (EU), focusing on aspects like human oversight, technical reliability, privacy, and accountability.²³ These guidelines aim to ensure safety and reduce bias, yet challenges remain concerning who is responsible for AI-generated content. The General Data Protection Regulation (GDPR) mandates strict rules on handling personal health data, especially in automated decision-making contexts.²⁴ To tackle these ethical issues, the proposed AI Act is designed to establish standards for transparency and oversight.

The International Committee of Medical Journal Editors (ICMJE) specifies four criteria for authorship²⁵: (1) significant contributions to the work (including design, data acquisition, analysis, and interpretation), (2) drafting or critically reviewing the manuscript for significant intellectual content, (3) final approval of the manuscript for publication, and (4) accountability for all aspects of the work. Since AI and AI-assisted technologies cannot be held accountable for manuscript accuracy, integrity, and originality, they are not permitted to be listed or cited as coauthors by major publishers. The World Association of Medical Editors (WAME) similarly advises against crediting AI tools as authors, emphasizing that human authors must ensure the accuracy of AI-generated content.²⁶ ► **Table 1** provides recommendations by various publishers for AI usage in writing and reviewing manuscripts.²⁷

Editors need reliable tools to identify content produced or altered by AI, and these tools should be available to all editors, regardless of their financial resources.

Manuscript Drafting

Generative AI tools such as ChatGPT and Microsoft Copilot are excellent tools for drafting the contents of manuscript, improvising upon the language, and offering suggestions on flow and structure of the manuscript. Its NLP capabilities allow it to assist in a wide range of writing tasks. However, the use should be complemented by specific specialized tools for grammar correction, plagiarism detection, or reference management.

- For language check, tools such as **Grammarly**, **Writefull**, and **LanguageTool** can be used, which employ

AI-based algorithms to provide advanced writing suggestions.

- **Plagiarism detection: Turnitin (iThenticate) or PlagScan** are rule-based software with AI elements that uses pattern recognition techniques to find potential matches. **Grammarly premium** uses AI in providing plagiarism detection features.
- **Reference Management: Mendeley** is a primarily rule-based software. But it has AI elements, enabling the features such as PDF annotation and recommendation systems. Other software programs such as **EndNote** and **Zotero** use rule-based algorithms for citation formatting and reference management and do not rely on AI.
- **Checking accuracy and flow: Writefull** utilizes AI to suggest improvements in language accuracy and flow, based on extensive training on academic texts, whereas other tools such as **Scribe** (rule based) and **SciFlow** (rule based with some AI elements) can also be used.

Pinto et al conducted a comparison between ChatGPT and a researcher with 10 years of experience in writing case reports, revealing that the human-written manuscript demonstrated superior presentation quality and nuanced writing.²⁸ ChatGPT struggled to capture the unique aspects of the presented data, resulting in a less refined case report. Among 22 reviewers, 12 could accurately distinguish the human-authored manuscript, but 4 mistakenly identified it as AI generated. The human manuscript received significantly higher scores for draft quality and effectively addressing nuanced points. Analysis with GPTZero showed that the human manuscript had notably higher “average perplexity score” (measuring complexity or unpredictability of the text), “burstiness score” (reflecting the variability in sentence structures), and “highest perplexity of a sentence” (indicating how challenging it is for an AI model to predict that sentence).

Suggested practical considerations for AI-assisted medical manuscript writing include the following:

- **Outline first:** Structure the manuscript before using AI tools.
- **Uniqueness:** The novel points in the manuscript should be kept in mind before reviewing AI-generated contents.
- **Expert oversight:** The authors (experts of the subject) must review and refine AI-generated content, by removing the repetitive contents and addition of unique points and other relevant scientific information.
- **Limit iteration:** Stop iterative prompting when the draft is detailed enough; focus on revising for uniqueness and eliminating redundancy.
- **Human touch needed:** Be cautious with AI in literature reviews and logical flow editing to retain human nuances.

Clinical Importance of AI in Medical Manuscript

While AI is being increasingly used in manuscript writing and research process, its main importance comes in its tangible use to improve patient care. The cornerstone of medical practice is evidence-based medicine, which is

Table 1 Recommendations for artificial intelligence (AI) usage in writing and reviewing manuscripts

IJCME	<ul style="list-style-type: none"> ● Authors must disclose AI usage in both the cover letter and the appropriate section of the manuscript ● Specify AI's role in writing assistance (acknowledgment section) or in data collection/analysis/figure generation (method section) ● Assess for plagiarism in AI-generated content and ensure proper citation of all quoted material
Cambridge University Press	<ul style="list-style-type: none"> ● AI use must be clearly declared and explained ● AI-generated content must adhere to Cambridge's plagiarism policy
IEEE	Disclose AI-generated content in the "Acknowledgments" section and specific sections of the article, except for editing and grammar enhancement
JAMA	Discourages submission and publication of AI-generated content unless integral to formal research design or methods
Springer Nature and Nature publications	<p>Document the use of large language models (LLMs) in the "Methods" section</p> <ul style="list-style-type: none"> ● Generative AI images are not allowed, except when directly referenced in articles specifically about AI ● Disclose the use of nongenerative tools for manipulating or enhancing images ● Reviewers should not use AI tools to review manuscripts but must declare if AI tools were used to support claims. Use of LLM should be properly documented in the "Methods" section
SAGE	<ul style="list-style-type: none"> ● Warns about limitations of AI tools, including biases and inaccuracies, especially related to Sex and Gender Equity in Research (SAGER) ● Authors must verify the accuracy and appropriateness of AI-generated content and indicate its usage in the "Methods" or "Acknowledgments" section ● Reviewers should not use AI for generating review reports or share manuscripts with AI tools
Taylor and Francis	<ul style="list-style-type: none"> ● Supports responsible use of generative AI tools, ensuring high data security, confidentiality, and copyright protection ● AI can be used for idea generation, language correction, interactive search, literature classification, and coding assistance ● Must acknowledge the tool's full name, version number of the tool, usage, and reason ● Synthetic data generation and image manipulation using generative AI are prohibited ● Reviewers/editors should not use AI tools for unpublished manuscripts or for summarizing articles; only language review/corrections are permitted
Wiley's	Use of a generative AI tool to develop any portion of a manuscript must be described, transparently and in detail, in the "Methods" section (or via a disclosure or within the "Acknowledgments" section)
Elsevier	<ul style="list-style-type: none"> ● Permits the use of AI tools to enhance text readability but not creating or altering scientific content. Authors should provide full disclosure of the use of AI. It prohibits the use of AI to generate or alter images, unless this is part of the research method

enhanced by ongoing clinical trials. Patient care is directly affected by the robustness and accuracy of clinical trials. Evolving AI tools can be used to increase the accuracy and inclusiveness of these clinical trials. For example, the Food and Drug Administration (FDA) is using digital health technologies (DHTs) in clinical trials, which enables continuous monitoring of patients' health through real-time data collection, facilitating timely interventions and personalized treatment plans.²⁹ They increase access to clinical trials for underrepresented communities, ensuring diverse representation in research. Additionally, DHTs enhance patient engagement by allowing individuals to track their symptoms and communicate effectively with health care providers.²⁹

Hidden Flaws of Artificial Intelligence

Skills to solve a complex problem cannot equate to intelligence. AI tools greatly mimic the human skills but extrapolate

the data and make false statements, so-called AI hallucinations, which cannot be easily identified if caution is not taken,³⁰ for example, giving wrong references/filling the missing data with erroneous data and hence giving false results. Its plausible answers do not equate to correct understanding and mastery of the language. Therefore, trust in AI tools, which is the key in medical practices, is still lacking.

This misinformation is another major issue, as inaccurate medical information can pose risks to patients, particularly when presented authoritatively without expertise.³¹

In addition, lack of transparency in how outputs are generated complicates error identification and quality assessment, while reliance on non-peer-reviewed sources raises the risk of misinformation.³¹

Human involvement in identifying these shortcomings is essential, so the concept of automotive AI should have humans in the loop in each step of the research and manuscript writing.³²

How to Cite the AI Tools

In scientific manuscript writing, AI-generated content should be cited and referenced with a high level of transparency. The specific AI tool used must be described, including the exact prompts and responses provided. AI tools should be cited as resources rather than authors, with details on the version and access format similar to software or databases. The suggested template is as follows:

- APA style:
 - OpenAI. (2023). ChatGPT (Mar 14 version) [Large language model]. ChatGPT.
 - Microsoft. (2024). Copilot [AI tool]. Microsoft Edge. Microsoft Edge.
- MLA or Chicago style:
 - OpenAI, ChatGPT, Mar 14 version, 2023, ChatGPT.
 - Microsoft. Copilot. 2024, Microsoft Edge, Microsoft Edge.

Current recommendations: The role of the AI model within the study must be described, along with how it fits into the project workflow. The name, version, and developer of the AI model should be specified. The prompts used, as well as any criteria for their selection, should be detailed. The dataset on which the AI model was applied must be described, and a reference to this dataset should be provided. The evaluation methods for the AI model’s output should be described, including the metrics used and the evaluators (or software programs) involved. If the performance of the AI model was compared with other methods, the comparison should be given, including the metrics and specifics of each method. Finally, any caveats and biases associated with the AI model that could affect the reproducibility of the study should be addressed.

Perils of detailed citation: Many articles have been published with excessive elaboration on the methodologies.

Articles claiming to be true to citation practices tend to enumerate every minutiae along the lines of “I asked ChatGPT x, and it responded with y.” Verging on the realm of a mere product review, these details can inadvertently overshadow the core research narrative, leading to a disinterest that is palpably felt by the reader.³³ As the adage goes, “The devil is in the details,” but when these details become overwhelmingly prominent, they may eclipse the broader intellectual discussion, leaving the manuscript bereft of its dynamism.

Thus, while precision in citation is paramount, a balance should be sought to ensure engaging presentation that ultimately sustains reader engagement and preserves the article’s scholarly allure.

Prompts and Inputs

Prompts are initial instructions or cues given to the AI to direct its response. They serve to guide the AI’s output by specifying the type of information or analysis required. The following points can help in creating effective prompts while writing a manuscript³⁴:

- Clear and explicit **definition** of the needed information should be provided. Example: “Detail the common MRI characteristics of multiple sclerosis lesions and their development over time.”
- **Parameters** should be specified with targeted prompts. For instance, “Compare the imaging features of benign versus malignant breast lesions on mammograms, excluding ultrasound data.”
- Relevant **context** and background details should be offered. For example, “This study investigates the effectiveness of low-dose CT for lung cancer screening. Examine

AI tools in manuscript writing										
Identifying a research topic	Conducting a literature review	Data analysis		Manuscript drafting	Editing and proofreading	Citation and referencing	Plagiarism detection	Peer review and final check stages of manuscript preparation		
Research Rabbit	Connected Papers	SAS	MATLAB	Grammarly	EndNote	Zotero	Mendeley	Turnitin	Grammarly	Turnitin
Elicit	Semantic Scholar	Tableau		Scrivener	ProWritingAid	EndNote		Copyscape		Scholarcy
Iris.ai	Iris.ai	Matplotlib		Writefull	Hemingway Editor	RefWorks		Quetext		Scribbr
ChatGPT (Research Mode)	Scite	Trifacta		ChatGPT	Slick Write	Cite This For Me		Plagscan		Writefull
Connected Papers	Elicit	OpenRefine		Ref-N-Write	LanguageTool	EasyBib		Unicheck		PubPeer
ResearchGate (AI Features)	Scholarcy	IBM Watson		Paperpile	Quillbot	Citefast		Plagiarism Checker		SciRev
Scite.ai	Litmaps	OpenScale		AI-powered Writing Assistants (like Jasper or Writesonic)	Writer	Citation Machine		by Small SEO Tools		Preprint Servers
	Rayyan			DeepAI	Ginger Software	BibMe		Scribbr		CrossRef
	PubMed with integrated AI filters like “Best Match”			Kuki Chatbot	WhiteSmoke	Paperpile		Plagiarism Detector		
	SciSpace Copilot				Zoho Writer	Scrivener		ProWritingAid		
	Mendeley				Outwrite	Cite While You Write		Plagiarism Checker X		
					AI Writer	Scribbr		DupliChecker		
					Prowriting	Citation Generator		Search Engine		
					Scribens	by MyBib		Reports Plagiarism		
					Kuki Chatbot	Kopernio (now EndNote Click)		Checker		
								Plagium		
								Noplag		

Fig. 2 Image showing various artificial intelligence (AI) tools that can be used on different stages of manuscript writing.

the dataset, which includes patient demographics, detection rates, and instances of false positives.”

- Request **Evidence** and References. For example, “Discuss the role of contrast-enhanced imaging in identifying hepatic lesions, citing recent studies and clinical guidelines.”
- **Format for responses** should be specified. For example, “Describe the radiological features of Crohn’s disease using bullet points, covering each imaging modality such as CT, MRI, and ultrasound.”

Inputs refer to additional details or clarifications provided during the ongoing interaction with the AI. They help refine the AI’s responses based on additional needs or specific feedback.

- **Provide additional details/context:** If the initial output is too broad, you might specify: “Focus on how dynamic contrast-enhanced MRI distinguishes between glioblastomas and metastases.”
- **Seek clarifications:** “Can you explain the validation process for the AI algorithms used for automated tumor detection in this study?”
- **Offer feedback:** With the feedback, further refinements can be requested. For example, “Reevaluate the relationship between MRI findings and clinical outcomes in rheumatoid arthritis, focusing specifically on joint effusion and synovitis.” Additionally, AI can be invited to ask for more information. For instance, “If you require additional details about patient demographics or specific imaging techniques used in this study, please let me know.”

Conclusion

As the field continues to evolve, embracing AI’s potential is essential for staying at the forefront of scientific writing. **–Fig. 2** offers a comprehensive overview of the tools required at each stage of the manuscript writing process. The key takeaway is clear: to truly master generative AI, there’s no substitute for hands-on experience. So, dive in, explore, and let AI be your guide in the ever-expanding world of academic innovation. If you want to learn generative AI, start using AI. It is the gateway to unlocking its full potential.

Ethical Approval

The study was approved by the ethical review committee of our institute.

Funding

None.

Conflict of Interest

None declared.

Acknowledgments

In preparing this manuscript, we made extensive use of several advanced artificial intelligence tools to gain first-hand experience and produce the manuscript of reasonable

relevance. We employed **ChatGPT (OpenAI, GPT-4)** and **Microsoft Copilot (Microsoft 365, Version 2024)** for drafting, correcting, and refining the language. We also used **Elicit (Elicit, Version 2.1)** for conducting a literature search relevant to the individual subsections of the article. Additionally, **Julius AI (Julius AI, Version 3.0)** was used in creating **–Fig. 1** that visually represents the hierarchy of the artificial intelligence.

Our use of these AI tools was done to gain direct experience with effective prompting techniques and to understand the merits and demerits of generative AI. This allowed us to explore the individual strengths of each tool. Despite the extensive use of these technologies, all AI-generated content was carefully reviewed and guided by the authors. Furthermore, we conducted a plagiarism check after writing to ensure the manuscript’s originality.

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