

From Pen to Processor: The Expanding Role of Artificial Intelligence in Medical Scientific Writing

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A New Epoch in Medical Communication

Scientific writing has always been the cornerstone of medical advancement, transforming clinical observations into shared knowledge. With the emergence of artificial intelligence (AI), particularly generative language models such as ChatGPT, Gemini, and Claude, a profound transformation is underway. These tools can now generate structured text, summarize literature, interpret data, and even emulate scholarly reasoning, reshaping how medical professionals write and communicate science.

This evolution invites both optimism and caution. While AI offers efficiency and inclusivity, it also challenges notions of authorship, originality, and intellectual engagement. The human intellect has long been the driver of hypothesis generation, analysis, and narrative synthesis in medical writing. Yet, as AI becomes increasingly capable, it invites reflection on how such tools can complement, how to integrate it responsibly, ensuring that technological innovation strengthens, rather than compromise, these human capacities and scientific integrity.

AI Across the Spectrum of Medical Writing

The reach of AI now spans nearly all forms of medical writing. In case reports and case series, AI assists in manuscript structuring, refining language, and highlighting clinical learning points. In original research and randomized controlled trials (RCTs), it can support proposal development, literature searches, statistical interpretation, and data visualization. For reviews and systematic analyses, AI-driven tools expedite literature screening, citation management, and data synthesis, facilitating rapid generation of evidence summaries and meta-analyses. At the editorial and peer-review stages, AI is increasingly used for plagiarism checks, grammar correction, reviewer matching, and triage enhancing workflow efficiency and consistency across journals.

These applications promise to democratize scientific communication, particularly benefiting researchers in resource-limited settings, where access to professional language editing and data analytics may be limited.

Benefits: Efficiency, Accessibility, and Intellectual Support

AI-assisted writing brings undeniable advantages. It enhances efficiency: automating repetitive writing tasks such as formatting, reference management, and grammatical correction, allowing clinicians and researchers to devote more time to conceptual work^[1,2]. It also fosters linguistic equity. For many scientists whose first language is not English, language barriers can impede publication. AI-based grammar and tone refinement tools can bridge this gap, offering a more level playing field for authors from low- and middle-income countries^[3].

AI serves as a cognitive aid, supporting literature synthesis and idea generation. By scanning vast bodies of medical literature, AI can identify patterns, gaps, and emerging themes, promoting creativity and more data-driven hypotheses^[4,5]. Editors and reviewers can use AI for preliminary quality checks, enhancing consistency and reducing time spent on mechanical tasks such as formatting and reference verification^[6]. Used judiciously, AI has the potential to augment, not replace the scientific mind, helping transform isolated findings into coherent medical knowledge.

Challenges: Accuracy, Ethics, and Erosion of Skills

Despite its promise, AI presents serious challenges that demand vigilance. A foremost concern is accuracy. Generative AI systems can produce fluent but factually incorrect statements and fabricated references: a phenomenon termed 'hallucination'^[7]. Without human verification, such content risks propagating misinformation and eroding trust in medical literature.

Equally concerning is intellectual dependency. Scientific writing has always been a process of analytical reasoning where authors scrutinize data, articulate arguments, and synthesize conclusions. Excessive reliance on AI could dull these cognitive skills, particularly among early-career researchers, producing manuscripts that are grammatically perfect yet conceptually shallow^[8].

Bias also represents another risk. AI systems are predominantly trained on data from high-income countries, which may misrepresent local disease patterns or healthcare realities in low- and middle-income nations^[9]. This can lead to recommendations or interpretations that lack relevance to regional contexts such as Sri Lanka's healthcare environment.

Lastly, ethical and authorship issues must be explicitly addressed. AI tools cannot be held accountable for research integrity or accuracy. The International Committee of Medical Journal Editors (ICMJE) and Committee on Publication Ethics (COPE) clearly state that AI cannot be credited as an author and its use must be transparently disclosed in manuscripts^[10, 11]. Transparency is critical to preserving trust in the scholarly record.

Preserving Human Creativity and Analytical Integrity

Scientific writing is more than assembling facts: it is a process of discovery and reflection. The act of writing compels researchers to think critically, refine arguments, and contextualize findings. While AI may produce linguistically precise text, it lacks empathy, judgment, and clinical insight. It cannot discern which hypotheses hold true significance or understand the nuances of human disease and care.

Thus, AI should be viewed not as a creative surrogate, but as an intellectual collaborator, one that amplifies human potential without diluting authorship. The researcher must remain the ethical and analytical anchor of the process.

Maintaining this balance is particularly crucial in academic medicine, where reflective reasoning and interpretive skill are vital. Excessive automation risks replacing intellectual rigour with superficial fluency. Writing remains an essential educational tool, cultivating precision, logic, and curiosity, all of which are indispensable to good science.

Guiding Principles for Responsible Integration

The responsible use of AI in medical writing rests on several key principles. Transparency is essential; authors should declare all instances of AI use, whether for drafting, editing, or data analysis. Verification must remain a central human responsibility; all AI-generated content must be critically reviewed and validated by the author. Accountability lies solely with human contributors. Education and training programs should emphasize ethical AI use, ensuring early-career researchers develop analytical and writing skills before relying on automation. Finally, editorial boards should establish clear policies defining permissible AI applications, promoting fairness and consistency across publications. These steps will help ensure AI functions as a tool for empowerment rather than a substitute for expertise.

Conclusion: Synergy, Not Substitution

Artificial intelligence represents both a challenge and a catalyst for medical science. It can accelerate writing, enhance inclusivity, and broaden participation in global research, but only if harnessed responsibly. The goal is synergy, not substitution. The future of medical communication lies in a partnership where AI complements human creativity, precision, and ethical reasoning. When guided by transparency and critical judgment, AI can help democratize access to science and strengthen the quality of medical literature worldwide.

Yet, the essence of scientific authorship remains human: the capacity to think deeply, analyze rigorously, and write with purpose. Technology should serve the spirit of inquiry, not overshadow it. If that principle endures, AI will become a powerful ally in advancing both the efficiency and integrity of medical scholarship.

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