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Special article

[Translated article] The role of artificial intelligence in scientific publishing: perspectives from hospital pharmacy

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ABSTRACT

The article examines the impact of artificial intelligence on scientific writing, with a particular focus on its application in hospital pharmacy. It analyses artificial intelligence tools that enhance information retrieval, literature analysis, writing quality, and manuscript drafting.

Chatbots like Consensus, along with platforms such as Scite and SciSpace, enable precise searches in scientific databases, providing evidence-based responses and references. SciSpace facilitates the generation of comparative tables and the formulation of queries regarding studies, while ResearchRabbit maps the scientific literature to identify trends. Tools like DeepL and ProWritingAid improve writing quality by correcting grammatical, stylistic, and plagiarism errors. A.R.I.A. enhances reference management, and Jenny AI assists in overcoming writer's block. Python libraries such as langchain enable advanced semantic searches and the creation of agents.

Despite their benefits, artificial intelligence raises ethical concerns including biases, misinformation, and plagiarism. The importance of responsible use and critical review by experts is emphasised. In hospital pharmacy, artificial intelligence can enhance efficiency and precision in research and scientific communication. Pharmacists can use these tools to stay updated, enhance the quality of their publications, optimise information management, and facilitate clinical decision-making.

In conclusion, artificial intelligence is a powerful tool for hospital pharmacy, provided it is used responsibly and ethically.

El Rol de la Inteligencia artificial en la Publicación Científica: Perspectivas desde la Farmacia Hospitalaria

Palabras clave:
Inteligencia Artificial
Publicación científica
Farmacia Hospitalaria
Escritura científica
Chatbots
Herramientas inteligencia Artificial
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RESUMEN

El artículo explora el impacto de la Inteligencia artificial en la escritura científica, con especial atención a su aplicación en la farmacia hospitalaria. Se analizan herramientas de inteligencia artificial que optimizan la búsqueda de información, el análisis de la literatura, la calidad de la escritura y la redacción de manuscritos.

Chatbots como Consensus, junto con plataformas como Scite y SciSpace, facilitan la búsqueda precisa en bases de datos científicas, ofreciendo respuestas con evidencia y referencias. SciSpace permite la generación de tablas comparativas y la formulación de preguntas sobre estudios, mientras que ResearchRabbit mapea la literatura científica para identificar tendencias. DeepL y ProWritingAid mejoran la calidad de la escritura al corregir errores gramaticales, de estilo y plagio. A.R.I.A. optimiza la gestión de referencias, mientras que Jenny AI ayuda a superar el bloqueo del escritor. Librerías de Python como langchain permiten realizar búsquedas semánticas avanzadas y la creación de agentes.

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A pesar de sus beneficios, la inteligencia artificial plantea preocupaciones éticas como sesgos, desinformación y plagio. Se destaca la importancia de un uso responsable y la revisión crítica por expertos. En la farmacia hospitalaria, la inteligencia artificial puede mejorar la eficiencia y la precisión en la investigación y la comunicación científica. Los farmacéuticos pueden utilizar estas herramientas para mantenerse actualizados, mejorar la calidad de sus publicaciones, optimizar la gestión de la información y facilitar la toma de decisiones clínicas.

En conclusión, la inteligencia artificial es una herramienta poderosa para la farmacia hospitalaria, siempre que se utilice de manera responsable y ética.

Introduction

Scientific research is a process that requires dedication and rigour, while seeking to go beyond the mere presentation of data. Its primary objective is to convince the scientific community of the validity of a hypothesis and provide solid evidence that will advance our knowledge. Against this background, artificial intelligence (AI) is emerging as an agent of change with the potential to transform the way scientific articles are conceived and developed.

However, integrating AI into research presents a number of challenges. Models such as ChatGPT, which are capable of generating human-like text, have raised ethical questions and highlighted the need for firm boundaries. Previous articles have even credited such models as authors.[1] Publishers have been quick to react, establishing clear policies prohibiting this practice. The guidelines of the International Committee of Medical Journal Editors[2] (ICMJE) and the World Association of Medical Editors[3] (WAME) stress the importance of transparency and accountability in the use of AI tools during manuscript writing. They also emphasise the need for effective tools to detect the use of AI in articles in order to preserve academic integrity.

The rise of AI in scientific writing has raised concerns about the integrity and validity of research. While AI tools offer the potential to create articles quickly and efficiently, they also pose significant risks that could undermine trust in science, including the ease of plagiarism, the incorporation of undetected bias, and the generation of false information. These challenges mean that we need to carefully assess how to integrate AI into research and establish safeguards to protect the quality and ethics of scientific knowledge.

Objectives

The aim of this review is to explore the shifting landscape of scientific writing as it increasingly comes under the influence of AI. We examine key AI tools for their potential to optimise tasks such as information search, content generation, and text revision.

Results

This section describes these tools and their uses. Table 1 provides a summary and links to these applications.

Conversational chatbots

Chatbots are AI programmes designed to simulate human conversation and are transforming the way we interact with technology. They use Large Language Models (LLMs) trained on vast amounts of data. Chatbots simulate human conversations by generating and understanding language. Some examples of conversational chatbots include OpenAI's ChatGPT,[4] Google's Gemini,[5] and Microsoft's Copilot.[6] They all use natural language processing and machine learning to generate human-like conversational text and maintain dialogue.[7,8]

However, chatbots have significant limitations. They can generate hallucinations and unverifiable text. While they are useful for basic

Table 1
Summary of AI tools analysed.

Tool	Main function	Link
ChatGPT	Conversational text generation	https://chat.openai.com
Gemini	Conversational text generation	https://gemini.google.com
Microsoft Copilot	Conversational text generation	https://copilot.microsoft.com
Claude	Conversational text generation	https://claude.ai
Scite	Research and writing assistance	https://scite.ai
SciSpace	Research and writing assistance	https://typeset.io
ProWritingAid	English language writing assistance	https://prowritingaid.com
LanguageTool	English language writing assistance	https://languagetool.org
Grammarly	English language writing assistance	https://www.grammarly.com
Paperpal	English language writing assistance	https://paperpal.com
Quillbot	Text writing assistance	https://quillbot.com
DeepL	Translation and writing style improvement	https://www.deepl.com/translator
A.R.I.A.	Zotero add-on that acts as a chatbot	https://github.com/lifan0127/ai-research-assistant
ResearchRabbit	Exploration and mapping of scientific literature	https://www.researchrabbit.ai
ConnectedPapers	Exploration and mapping of scientific literature	https://www.connectedpapers.com
Jenni AI	Text generation and writing assistance	https://jenni.ai
Yomu AI	Text generation and writing assistance	https://www.yomu.ai
CoWriter AI	Text generation and writing assistance	https://cowriter.ai/es

tasks such as translation, greater potential can be unlocked by building custom chatbots. In addition to being trained with domain-specific data, these chatbots can be given detailed instructions to guide their behaviour and responses. This allows for greater control over the information they generate and the tasks they perform.

The search for accurate and truthful information is crucial in the production of scientific papers. To this end, customised chatbots can be strategic allies for authors. Tools such as Consensus and SciSpace, available via subscription to ChatGPT,[4] exemplify the potential of these chatbots. Based on research and academic articles, they can provide accurate answers, including relevant references, by accessing and processing information from scientific article databases and receiving detailed instructions. All this facilitates the authors' tasks and improves the quality of their work.

However, if one is needed for a specific purpose, the best approach could be to create a custom chatbot. Platforms such as ChatGPT,[4] Copilot,[6] POE,[9] or HuggingChat[10] allow custom chatbots to be easily created. In this case, how the instructions for the chatbot are designed is of utmost importance. The following scheme is recommended for writing the instructions:

- Task: Clearly and concisely define the goal or main idea.
- Context: Provide the context or scope in which it will act.
- Example: Include one or more representative examples of the desired interactions.
- Persona: Specify the personality, style, and tone the chatbot should use. For example: “Act as a professor of pharmacokinetics, using simple and direct language, avoiding unnecessary technical jargon, and applying an academic tone.”
- Format: Indicate the desired format, such as text, bulleted list, etc.
- Tone: Set the general tone of the answers, whether formal, informal, academic, and so on.

Research assistants

Scite

Scite[11] is an AI platform that acts as an advanced research assistant. It uses natural language processing models to provide functionalities that enhance scientific research and writing. It aids researchers with tools for content generation, reference searching, impact analysis, and citation management. The main functions are as follows:

Advanced AI assistant: Scite's assistant stands out for its access to full-text scientific articles and its high capacity for customisation. This gives it the ability to generate precise answers adapted to the particular requirements of each researcher.

Chrome extension: This browser add-on provides additional information on citations, mentions, and comparisons of the articles consulted. This functionality makes it easier to evaluate the relevance of the articles, which is particularly useful in databases such as PubMed.

Reference checker: Scite is able to check the reliability and impact of academic references. It examines each citation, analyses whether corrections or retractions have occurred, and provides citation statistics. It also makes it easier for authors to identify and correct problems in references, thus improving the quality and credibility of their research

SciSpace

SciSpace is an AI platform designed to optimise the review and analysis of scientific literature.[12] It aims to streamline and facilitate literature searches. SciSpace summarises and extracts relevant information from a selection of articles, either uploaded by users or picked from an extensive repository of more than 200 million documents. SciSpace allows querying multiple articles at once. The tool also interprets tables and graphs within an article.

One feature that makes SciSpace stand out is its ability to generate comparative tables, which facilitate the formulation of questions about different studies. These questions can involve both design aspects and results. It also allows for customised queries.

The SciSpace Chrome extension provides real-time explanations, summaries, and answers to questions posed while reading online articles. This tool integrates a paraphraser and an AI detector, essential for studying the impact of AI on scientific articles.

Elicit[13] is a similar platform that provides functionalities for reading and analysing scientific articles, although it offers a more limited set of tools than SciSpace.

Translators and style editors

ProWritingAid[14]

ProWritingAid is a powerful tool for improving scientific writing in English. The platform offers advanced features in addition to basic grammar and spelling correction. It has tools to analyse readability, lexical redundancy, and syntax, and to detect plagiarism. These tools help refine manuscripts, achieving clearer and more effective communication.

In addition, ProWritingAid is compatible with various platforms such as Microsoft Word or Google Docs and has extensions for different browsers.

Other alternatives to consider for improving scientific writing in English include *LanguageTool,*[15] *Grammarly,*[16] *Quillbot,*[17] and *Paperpal.*[18] Each has its own specific approach and strengths.

DeepL

DeepL Translator (DeepL)[19] is notable for its high-quality translations in over 26 languages. It generates a version of a provided text in the desired language that is not only clear and fluent, but also consistent with the original message. In addition, DeepL can be extended with the DeepL Write module, which helps refine the translated text. This module specialises in improving grammar, style, and tone to improve writing quality. Currently, DeepL Write is only available for English and German texts.

Reference managers

A.R.I.A.

The incorporation of AI chatbots into reference management software has provided researchers with a very useful option. In this regard, Artificial Intelligence Research Assistant (A.R.I.A., in reverse order) stands out.[20] A.R.I.A. is an add-on to the Zotero bibliographic manager that allows users to easily access and reference personal libraries, thanks to functions such as auto-complete and drag-and-drop. The process of integrating A.R.I.A. with Zotero is straightforward. Download the “.xpi” file and add it to Zotero via the “add-ons” function.

Once installed, A.R.I.A. can compare documents, summarise research, and even analyse the work of specific researchers, all within the Zotero interface. This functionality is particularly valuable as it

allows information to be rapidly summarised, which is crucial when dealing with large numbers of articles. The add-on incorporates an experimental visual analysis based on the GPT-4 Vision model. It allows images, tables, and formulas to be uploaded to a chat window, making them easy to interpret and analyse.

Reference maps

ResearchRabbit

ResearchRabbit[21] is a tool that allows users to efficiently explore and visually map scientific literature. This platform uses network analysis and machine learning to help discover connections between different research papers, identify emerging trends, and track the evolution of a field of study.

By entering keywords or article titles, ResearchRabbit generates interactive images that show networks of connections between papers, including similar, earlier, and later works. Users can navigate through these networks, explore the details of each publication, and add relevant articles to their own collections. In addition, integration with Zotero can synchronise searches and help organise workflow. This tool is particularly useful for healthcare professionals who wish to conduct comprehensive literature reviews in a highly visual, streamlined manner.

ConnectedPapers is an alternative to the ResearchRabbit tool.[22] ConnectedPapers is a paid platform, but does not offer significant advantages over ResearchRabbit, which is currently free.

Writing tools

Jenny AI

Tools such as Jenny AI[23] offer practical solutions to overcome writer's block by suggesting text alternatives and simplifying the writing process. In this way, authors can concentrate on more complex aspects of the manuscript.

This AI writing tool can be integrated with specialised databases, such as Scite, to generate citations and references, and significantly reduce the workload of searching and organising them.

Additionally, Jenny AI allows users to incorporate documents relevant to their research topic, enhancing the quality and accuracy of the generated answers.

Alternatives with similar functionalities are Yomu AI[24] and Cowriter AI,[25] which can also be useful in the writing process.

However, it is vitally important to maintain a critical eye and not to delegate the entire writing process to AI. We recommend that it be used with caution as a useful aid for specific tasks. It is essential that authors thoroughly review any generated content before its final inclusion in their scientific articles.

Python

Python libraries are sets of pre-written functions that programmers can use to add functionality to their programs without having to write code from scratch. They facilitate specific programming tasks, such as data analysis. Python offers advanced tools for working with LLMs, including the LangChain library.[26] In addition to providing access to state-of-the-art models, such as GPT-4 or Gemini, LangChain makes hundreds of open source models available on the Huggingface website.[27]

Traditional keyword searching, while useful, can be limited by not capturing the richness of the underlying meaning of the language. Embeddings offer a solution to this limitation by representing words, phrases, or documents as numeric vectors that capture their semantic meaning and the relationships between them. LangChain allows the creation of databases using these vectors, enabling advanced semantic searches that go beyond keyword-based searches. For example, a database with embeddings of pharmacy service documentation could be searched for specific terms and also for related concepts or ideas, facilitating more accurate and efficient information retrieval, even when the exact words are not used.

One of the most innovative applications in AI is the use of multi-agent systems. They act as teams of experts, where each member brings their specialised knowledge to achieve a common goal. Each agent is an AI model with specific instructions to perform a particular task. This division of labour, based on specialisation, allows for process optimisation and provides higher quality results. Agents communicate with each other and with users, ensuring smooth and efficient collaboration. A practical example would be a scientific writing system that uses an agent for information search, another for text generation, and a third for revision and improvement. This division of labour optimises the process by assigning each task to an agent with the appropriate skills. Libraries such as AutoGen[28] and crewAI,[29] available on GitHub, offer tools for creating such specialised multi-agent systems.

Discussion

Hospital pharmacy, like any other scientific field, is driven by the need to generate and disseminate up-to-date and accurate knowledge. In this context, AI is emerging as a tool with transformative potential, capable of assisting researchers at all stages of the scientific writing process. AI-based systems can optimise and streamline research, from searching and analysing the literature to reviewing and refining the final text. Thus, hospital pharmacy professionals can to dedicate more time to critical analysis and the interpretation of results.

However, the integration of AI in this field also raises ethical and methodological challenges that must be carefully considered to ensure responsible and effective use of these technologies. Concerns such as the introduction of bias, misinformation, privacy, lack of transparency, plagiarism, and authorship[30] call for a responsible and cautious approach. Critical peer review is crucial to validate AI-generated data prior to its clinical application.

Although some publishers have expressed concern that AI will compromise the integrity of publications, a balanced approach would allow the benefits of AI to be harnessed without sacrificing quality. However, an additional challenge is the increasing difficulty in distinguishing AI-generated text from human-generated text. AI detection programmes are not infallible and can be circumvented by paraphrasing tools, increasing the risk that AI-generated articles will be mistakenly attributed to humans.[31] It is therefore essential to develop robust strategies to ensure transparency and accountability in the use of AI in scientific writing.

A key set of measures must be implemented to facilitate the ethical and responsible use of AI in scientific writing. Transparency must be paramount, with clear guidelines established for the use of AI tools in research and publication. Peer review processes need to be strengthened to ensure thorough and rigorous evaluation of papers using AI. It is also crucial to invest in cutting-edge technology to monitor the use of AI, and

to educate authors in ethical and responsible practices in this area. These measures will not only encourage innovation, but also maintain quality standards in academic publishing.

AI tools for science writing are evolving rapidly. This review has explored representative options in each category and shown their current potential. However, researchers should keep abreast of the new AI-based solutions that are constantly emerging.

Although AI-based tools can be of great help, not all of them are freely available. Some platforms require subscriptions or payments, which can restrict their use, particularly for researchers with limited budgets. A review of the alternatives allows us to make a better cost–benefit analysis of such tools. Hospitals with sufficient finding may opt for premium versions, whereas independent researchers or those with limited budgets may need to consider cheaper or free options. This risks further widening the resource gap between research institutions.

As noted by Scott,[32] pharmacists must take a proactive role in building the future of the profession, anticipating and adapting to the changes that AI will bring. This entails becoming deeply involved in the development of AI solutions. The application of AI tools, such as those reviewed in this article, provides examples of how pharmacists can take advantage of these advances. However, it is crucial to maintain a critical stance to ensure that AI in academic and clinical settings is used responsibly and in line with our professional values. The integration of AI into hospital pharmacy represents an opportunity for pharmacists to take a leading role in transforming their practice, as described by Morillo et al.[33] Far from being replaced by technology, pharmacists can leverage the power of AI to enhance their value within healthcare teams.

AI is transforming hospital pharmacy by providing tools that optimise research, scientific writing, and information management. Chatbots, research assistants, and literature mapping platforms streamline tasks and improve efficiency. However, it is critical to address ethical concerns such as bias and misinformation. Hospital pharmacists must take an active role in building the future of the profession by integrating AI ethically and effectively. This will empower their work and contribute to the advancement of scientific knowledge for the benefit of healthcare.

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Statement of authorship

Vicente Gimeno was responsible for the conceptualisation and methodology of the paper, the analysis of the AI tools, and the drafting of the manuscript, including its critical revision. Cristina Trigo contributed to the conceptualisation and supervision of the project and co-authored the original draft. Both authors played key roles in the design and execution of this study.

CRediT authorship contribution statement

Vicente Gimeno-Ballester: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Cristina Trigo-Vicente:** Writing – original draft, Validation, Supervision, Conceptualization.

Declaration of competing interest

None declared.

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