A Bibliometric Analysis of Chatbot or ChatGPT in Nursing Fields from 2022 to 2024

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ABSTRACT

Nursing education has undergone a significant transformation as a result of artificial intelligence (AI). Chatbots, specifically ChatGPT, have emerged as vital AI technologies within the nursing domain as it is a computer program designed to simulate human conversation through text or voice interactions. This study aims to conduct a bibliometric analysis to gain insights into the publication trends, citation impact, and thematic evolution in nursing education and practice concerning ChatGPT and chatbots. A comprehensive bibliometric analysis was performed using VOSViewer, concentrating on citation networks for data analysis and visualisation. A review of LENS.org identified 344 relevant research publications regarding chatbots and ChatGPT within the nursing discipline, all of which were utilised in the study. The study examined various aspects, including types of publications, prominent authors, leading journals, participating nations, institutions, and the impact of ChatGPT on nursing practice. The primary objectives included categorising the papers, identifying the most influential authors, delineating the prominent areas and institutions in the field, and examining the impact of ChatGPT on nursing education and practice. The findings indicate that ChatGPT positively impacts nursing education by enhancing learning experiences, improving communication, and aiding clinical decision-making. The findings indicate that journal articles accounted for 76% of publications, with the U.S. leading in research output. The findings indicate that ChatGPT positively impacts nursing education by enhancing learning experiences, improving communication, and aiding clinical decision-making. Future research should focus on establishing frameworks for integrating ChatGPT into nursing education, addressing ethical implications, and assessing the long-term impacts on patient care.

INTRODUCTION

Artificial intelligence (AI) has been benefiting the educational landscape for numerous years, and nursing education is no exception. AI has been used to encourage student engagement in nursing programmes,[1,2] create personalised learning experiences,[3] and improve simulation training.[4,5] With the continuous advancement of AI technology, it is becoming more and more important to equip student nurses with the necessary skills to effectively adapt AI in their nursing practice.[6] Among various AI technologies, ChatGPT is gaining rapid adoption in nursing education and clinical support.

ChatGPT produces human-like text responses and can thus be adopted as a learning assistant to help students effectively prepare for real patient interactions. [7,8] Furthermore, statistical analyses show that the integration of AI into simulation debriefing in nursing education improved student nurses' confidence, knowledge, and satisfaction, which can directly influence their performance. [1] Thus, it is important to develop a framework for conceptualising and promoting the use of ChatGPT in nursing education. Plus, just like other AI-based technologies, it is also important to raise awareness

about the advantages and limitations of chatbots[9,10] and to investigate effective ways to integrate them into the curriculum to maximise their benefits for student learning.

LITERATURE REVIEW

Chatbots/ChatGPT in Education

Teaching and learning are changing as technology advances. Education uses chatbots, recommendation systems, intelligent tutors, and learning analytics apps to provide customised assistance to students. Like humans, these chatbots can answer enquiries, give assignment comments, and offer study advice to improve learning.[11] It supports students who learn at different speeds in the classroom and through distance learning by helping them assimilate knowledge at their own pace.[12] Chatbots in education are not new, especially with the introduction of ChatGPT in 2022. The majority of chatbots in use prior to ChatGPT were rule-based, meaning that they reacted to user input in accordance with rules and guidelines that were preset and created by human developers.[13,14]

Chatbots/ChatGPT in Healthcare

In healthcare, ChatGPT has been used in many ways, such as providing personalised information on symptoms and treatments,[15,16] offering evidence-based recommendations for diagnosis and treatment planning[17] and even assisting in creating realistic healthcare simulation scenarios to help nursing educators.[8] Its ability to learn and adapt makes it a valuable tool for improving patient care and accessibility to medical information. ChatGPT is also helping management tasks in hospitals by making scheduling appointments and billing more accurate and efficient, which allows doctors to spend more time caring for patients.[18] Numerous studies have examined ChatGPT's impact on nursing education, but no bibliometric study has been done. With research in this subject, researchers can refer to it to identify domain-wide issues and trends. Thus, a bibliometric analysis is urgently needed to guide future research.

Chatbots/ChatGPT in Nursing Education

Nurses have historically depended on a range of technologies in education, simulation, and clinical practice.

However, with the availability of advanced AI-enabled tools like big data analytics, ChatGPT, chatbots, and virtual reality, the nursing field is presented with both prospects and hurdles.[19] Technology has profoundly reshaped the healthcare industry, prompting changes in medical and nursing practices, enhancing workforce safety and efficiency, and advancing patient outcomes.[20]

AI-powered chatbots like ChatGPT can enrich problem-based learning, especially in nursing processes.[21] ChatGPT holds the potential to transform nursing education and research by simplifying the process.[22] It has transformed nursing by providing an efficient, accessible, and versatile tool.[23] Its integration into nursing practice holds the promise of enhancing patient care, streamlining administrative processes, and fostering the ongoing development of nursing professionals, ultimately elevating the overall quality of healthcare delivery. However, while AI technologies offer potential benefits such as aiding in patient documentation, reducing nurses' workload, and enhancing practice efficiency, they should not supplant human experience, discernment, personality, or responsibility.[24]

In nursing education, AI simplifies learning for students by aiding their understanding of complex topics. It can generate practice scenarios and enable nursing students to refine their communication and critical thinking skills.[25] AI can support students in assignments, provide realistic scenarios, and facilitate personalized learning, but concerns such as academic integrity, plagiarism, ethics, and misinformation must be addressed.[26] ChatGPT may improve nursing education results. Interactive learning scenarios with non-virtual or virtual patients are part of these experiences. ChatGPT can create patient scenarios and practice clinical decision-making skills to give students feedback on their decisions and create a more immersive and engaging learning experience in a safe environment, improving patient care and outcomes. AI offers nursing education innovations, but educators must carefully negotiate difficulties to maximise its benefits. Nurses must embrace AI-enabled innovations and critical thinking to develop in the profession and lead in the digital future.[22]

Research Questions

This study is guided by the following research question: What is the current state of research on the use of chatbots and ChatGPT in the nursing field, as reflected in the scholarly literature from 2022 to 2024? This question is further broken down into the following sub questions:

1. What are the publication types and scholarly works of chatbots/ChatGPT and nursing over time?
2. Who are the prominent authors and most influential journals in the chatbot/ChatGPT and nursing field studies?
3. What are the institutions involved in the chatbot/ChatGPT and nursing field studies?
4. What are the effects of chatbots/ChatGPT on the nursing field?

METHOD

A bibliometric analysis begins with defining the objective and scope of the study. The primary objectives included categorising the papers, identifying the most influential authors, delineating the prominent areas and institutions in the field, and examining the impact of ChatGPT on nursing education and practice using bibliometric methods. This involves analysing various research components and identifying the relationships among them.

According to Sjöstedt et al.,[28] a comprehensive bibliometric analysis should include at least 50 publications to ensure adequate depth and coverage. Accordingly, this study includes more than 50 scholarly articles, providing a broad base for meaningful bibliometric evaluation.

The literature was analysed using VOSviewer and quantitative approaches for domain-specific data. The software makes bibliometric graphs showing article co-authorship, citations, and bibliographic linkages from digital database data. This method outperforms quantitative methods in accuracy and efficiency. It reduces the reader's cognitive load and objectively identifies industry research needs and hot topics.

The main steps in the analysis are as follows:
1. Data Collection: Retrieve relevant publications from selected databases based on defined inclusion criteria.
2. Data Cleaning and Preprocessing: Standardise author names, keywords, and institutional affiliations to ensure consistency.
3. Data Analysis Using VOSviewer:
   - Citation Analysis: Explore how frequently articles are cited.
   - Co-citation Analysis: Examine how often two articles are cited together.
   - Co-occurrence Analysis: Identify key terms and topics that frequently appear together. The minimum number of keyword occurrences was set to 5.

Co-authorship Analysis: Map collaborative networks among authors and institutions. The clustering algorithm used was the VOS clustering technique, which maximises a quality function that is a weighted, resolution-parameterised variant of Newman's modularity; optimisation is done with the Smart Local Moving (SLM) algorithm.

Data Collection

Rather than relying solely on keyword searches, which may suffer from ambiguity due to inconsistent terminology, VOSviewer constructs networks based on bibliographic coupling and citation links between documents, allowing for more objective clustering of related publications.[29] Relationships were defined without relying on specific keywords, as it proved challenging to provide a more precise explanation of their meaning.[30] When applied in different contexts, keywords can be interpreted in various manners.[31] As a result, the categorisation of clusters can become ambiguous, leading to challenges in analysing the judgements made regarding clustering.[32,33] Therefore, VOSviewer categorises articles into various groups by analysing the connections between them. To circumvent any potential technical or analytical complications, we have categorised the specific articles included in this analysis into separate groups. This is the approach that was taken to gather data.

A Lens.org search was done on June 30, 2024. Search terms included "Chatbot" OR "ChatGPT" AND "nursing". We obtained 344 academic articles from our query and used VOSviewer for bibliometric analysis. The collection comprised journal articles, editorial notes, conference proceedings, book chapters, letters, and preprints. Specific criteria were used to evaluate studies for inclusion. These requirements included an emphasis on chatbots and ChatGPT in nursing research, sufficient study information, English writing, and persuasive outcomes. Manual screening or inter-rater agreement was applied during inclusion. Studies were excluded if they were

    i. duplicates
    ii. irrelevant
    iii. not relevant to the research issue
    iv. written in a different language,
    v. not complete texts
    vi. or not related to nursing

Procedure of Data Analysis

This paragraph details the sequential content analysis procedure. We initially used The Lens citation report. This report shows citation and publication trends. We used the citation report to analyse publishing trends for search topics. VOSviewer received 344 well-selected scholarly articles in the second phase. After some time, we used co-occurrence investigation to do a bibliometric study of publication kinds, academic works throughout time, famous authors, top journals, top countries/regions, and institution names. Using co-occurrence data, the progress was analysed. A bibliometric assessment of the citation network was done with VOSviewer. The application received 344 articles in the third phase. VOSviewer provides author, title, and source information.

Following screening, the selected articles underwent data preprocessing to standardise author names, keywords, and institutional affiliations to ensure consistency. The pre-processed data were then imported into VOSviewer software for comprehensive bibliometric analysis. Four types of analyses were conducted:

1) Citation Analysis to explore how frequently articles were cited.
2) Co-citation Analysis to examine how often two articles were cited together.
3) Co-occurrence Analysis to identify key terms and topics that frequently appeared together (minimum of 5 keyword occurrences).
4) Co-authorship Analysis to map collaborative networks among authors and institutions.

The clustering algorithm used was the VOS clustering technique with Smart Local Moving (SLM) algorithm optimisation. The results from these analyses were visualised as network diagrams, which were subsequently interpreted and reported to address the research questions.

RESULTS

This section presents the findings of the bibliometric analysis of 344 publications on chatbots and ChatGPT in the nursing field from 2022 to 2024. The results are organised to address the four research questions systematically. First, we examine the publication types and temporal trends of scholarly works to understand the evolution of research output in this domain (RQ1). Second, we identify the prominent authors and most influential journals contributing to this field, highlighting key researchers and publication venues (RQ2). Third, we analyse the institutional landscape to reveal the geographic distribution and leading institutions engaged in chatbot and ChatGPT research within nursing (RQ3). Finally, we explore the effects and applications of chatbots and ChatGPT on nursing practice and education through citation network analysis (RQ4). Together, these findings provide a comprehensive overview of the current state of research and the impact of AI-powered conversational technologies in the nursing discipline.

RQ1: Publication Types and Scholarly Works Over Time

Since ChatGPT was initiated on November 30, 2022,[34] this analysis started from December 2022 until June 2024. The analysis results indicated the total number of

scholarly works, which includes journal articles, conference proceedings, letters, editorials, preprints, book chapters, and news articles. Throughout the years, the top scholarly work is the journal article with the highest number of publications (264 articles, 76.74%), followed by editorial (30 articles, 8.72%), letter (28 articles, 8.14%), preprint (17 articles, 4.94%) and news (2 articles, 0.58%), and the least published are book chapters (0.29%), conference proceedings (0.29%), and others (0.29%), with 1 article for each type of mentioned publication. For journal articles, the number of relevant studies significantly fluctuated until June 2024 (Figure 1). For other types of publications, for example, letters, preprints, and editorials, the numbers are relatively consistent (Figure 1). According to this analysis, we need more information beyond June 2024 to better observe the trend in the future.
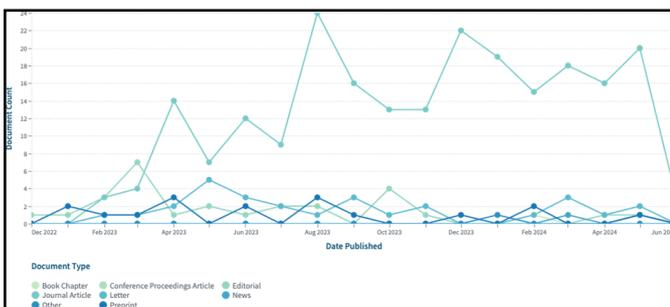

Figure 1. Scholarly works over time.

RQ2: Prominent Authors and Most Influential Journals

Geographically and institutionally, the top 10 nursing and chatbot/ChatGPT researchers are diverse (Table 1). Katholieke Universiteit Leuven's Academic Centre for Nursing and Midwifery's Liesbet Van Bulck and Philip Moons lead with seven articles apiece, highlighting their efforts. Five articles by Ahmed Lateef Alkhaqani from Kufa University in Iraq and Viroj Wiwanitkit from Chandigarh University in India indicate ongoing research in these places. Four articles by private academic consultant Amnuay Kleebayoon in Cambodia and Gregor Štiglic from the University of Maribor in Slovenia demonstrate the collaboration between private consultants and university institutions in generative AI research. Jialin Liu from West China Medical School, Siobhan O'Connor from King's College London, and Siru Liu from Vanderbilt University Medical Centre, each with

four articles, emphasise China's, the UK's, and the US's contributions. Finally, Sirwan Khalid Ahmed, of the University of Raparin in Iraq, emphasises Middle Eastern research. This varied set of writers represents global interest and collaboration in nursing AI applications.

Figure 2 shows a concentrated but fragmented venue landscape: publications cluster most strongly in nursing-education journals (e.g., Nurse Education Today/in Practice/Nurse Educator), signalling that chatbot/ChatGPT work in nursing is currently education-led (curriculum, assessment, academic integrity), while general nursing/practice outlets (e.g., International Journal of Nursing Studies, Journal of Advanced/Clinical Nursing) and clinical subspecialty titles (cardiovascular, oncology) carry a smaller but growing share that reflects use-case pilots and early practice evaluation. A visible long tail across many additional journals, including health-informatics/biomedical engineering venues, indicates a young field without a single "home" journal; methods and implementation pieces are being imported from cross-disciplinary outlets and cited by nursing papers to frame feasibility and risk. Overall, the pattern points to an area that is anchored in pedagogy, with select clinical niches beginning to adopt and test tools, and diffusion occurring across diverse, relatively low-count outlets.

**Table I.** Prominent Authors, Document Count, Affiliation, and ORCID ID.

Author Display Name	Document Count	Affiliation	ORCID iD
Liesbet Van Bulck	7	Academic Centre for Nursing and Midwifery, Katholieke Universiteit Leuven, Belgium	0000-0001-8975-4455
Philip Moons	7	Academic Centre for Nursing and Midwifery, Katholieke Universiteit Leuven, Belgium	0000-0002-8609-4516
Ahmed Lateef Alkhaqani	5	College of Nursing, Kufa University, Al-Najaf, Iraq	0000-0002-7694-7503
Viroj Wiwanitkit	5	Chandigarh University, Punjab, India	0000-0003-1039-3728
Amnuay Kleebayoon	4	Private Academic Consultant, Samraong, Cambodia	Not Available
Gregor Štiglic	4	Faculty of Health Sciences, University of Maribor, Slovenia	0000-0002-0183-8679
Jialin Liu	4	Department of Medical Informatics, West China Medical School/West China Hospital, Sichuan, China.	Not Available
Siobhan O'Connor	4	Faculty of Nursing, Midwifery and Palliative Care, King's College London, United Kingdom	0000-0001-8579-1718
Siru Liu	4	Vanderbilt University Medical Center, Nashville, United States	Not Available
Sirwan Khalid Ahmed	4	College of Nursing, University of Raparin, Rania, Iraq	0000-0002-8361-0546

Figure 2. Top journals published the chatbot/ChatGPT in the nursing field.
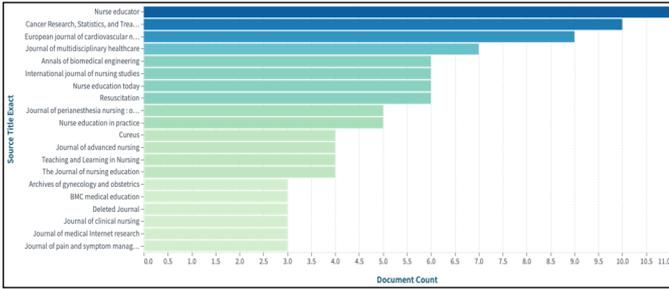
RQ3: Institutions Involved in Chatbot/ChatGPT Research

This section discusses how different countries contributed to chatbot/ChatGPT and nursing field research publications. Europe and North America publish more, concentrating their contributions. Also evident are Japanese, Singaporean, and Chinese influences. African, South American, and Middle Eastern countries' low document submissions might be addressed. According to Figure 3, Columbia University submitted the highest number, with 8 documents. Katholieke Universiteit Leuven and the National University of Singapore follow closely; 7 and 6 documents, respectively, show their engagement. The universities in Cape Town, Florida, and Gothenburg each provided five papers. The University of Cape Town's Department of Paediatrics and Child Health, Duke, Harvard, and the Institute of Health and Care Sciences University of Gothenburg upload 4 more documents, making it the top contributor. Research is worldwide, with European, North American, Asian, and African universities contributing. The data suggests that colleges with more documents have more research money, focused objectives, or big collaborative networks that increase productivity. Specialised departments like Cape Town Paediatrics and Child Health value targeted academic research. Document counts show that strategic focus, funding, and cooperation boost scholarly productivity and exposure.
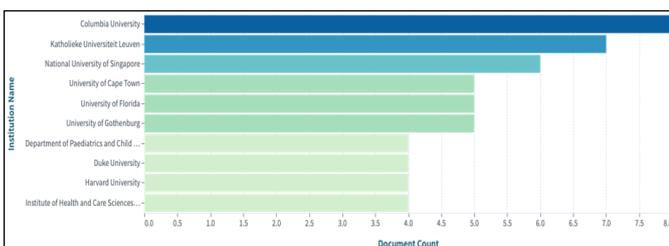

Figure 3. Top institution names involved in the chatbot/ChatGPT and nursing field studies.

RQ4: Effects of Chatbot/ChatGPT on the Nursing Field

To address RQ4, this study examined the publications and constructed an additional citation network based on VOSViewer (Figure 4). This citation network included a total of 344 publications. After excluding studies that did not reach seventeen citations and contained "nursing" as a keyword, our focus shifted to the ones conducted by several articles [24,34–40]. It was found that all eight articles explored the effects of incorporating chatbots in the nursing field. Dwivedi et al. discuss the broad applicability of AI tools like ChatGPT, which can generate human-like text and enhance productivity in various fields.[24]

Beyond counts, Figure 4 shows two small, weakly connected themes. One cluster gathers education-ethics/academic-integrity debates, O'Connor's "tools for academic progress or abuse?" [41] anchors a discussion that is extended by Choi et al. on "chatting or cheating?" [35] in nurse education and Abdulai & Hung on whether ChatGPT undermines ethical values [34]. The second cluster is practice/clinical enablement, where Moons & Van Bulck appraise value for cardiovascular nurses,[37] Scerri & Morin outline practice support,[39] and Gunawan surveys future uses in nursing.[36] Dwivedi et al. sits at the periphery as a cross-disciplinary opinion hub that multiple nursing papers cite to situate their arguments.[24] The long, sparse links, especially the bridging role of O'Connor, indicate conceptual cross-citation rather than tight co-authorship, suggesting leading authors are thematically aware of each other's work but largely operate in siloed teams across different journals/venues.
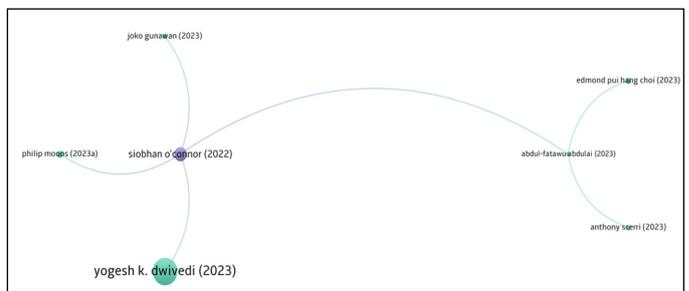
Figure 4. The visualisation of the citation network in VOSViewer.

DISCUSSION

ChatGPT has over 100 million users after two months of debut.[42] This chatbot is one of several with advanced AI. This technique has generated a lot of medical and health research publications.[43] However, nursing professionals and academics have little chatbot usage data. We did a bibliometric analysis of chatbot/ChatGPT technologies to better understand how the scientific and medical community has reacted to their use in both academic and clinical settings.

The discussion is organised around the four research questions that guided this study. We begin by interpreting the publication trends and scholarly output patterns observed over time, which reveal the rapid growth of interest in this domain (RQ1). Next, we discuss the contributions of prominent authors and influential journals, highlighting key thought leaders and publication venues that are shaping discourse in this field (RQ2). We then examine the geographic and institutional distribution of research activity, considering factors that may explain regional variations in engagement with chatbot and ChatGPT technologies (RQ3). Finally, we synthesise findings related to the effects and implications of these AI tools on nursing practice and education, addressing both opportunities and challenges identified in the literature (RQ4). Throughout this discussion, we contextualise our findings within the broader landscape of AI adoption in healthcare and nursing, while considering ethical, practical, and educational implications for the profession.

RQ1: Publication Types and Scholarly Works Over Time

RQ1 examined nursing chatbot/ChatGPT trends and technologies using bibliometrics. Analysis of journal article, editorial, letter, and preprint tendencies and scholarly activity might guide future study. Journal papers are the most common publications in our analysis, highlighting the rising popularity of chatbot/ChatGPT and nursing. Journal articles preserve study findings and provide dependable references for future studies.[44] Journals also foster collaboration and networking.[45] RQ1 showed the trend of research on chatbot/ChatGPT tools in nursing, which began in December 2022 due to

internet users' ChatGPT usage in November 2022.[42] The dominance of journal articles as the primary publication type indicates that the research in this field is reaching a level of maturity where it is being disseminated through formal academic channels. The steady increase in the number of publications over the past two years suggests that this is a vibrant and active area of research that is likely to continue to grow in the coming years.

RQ2: Prominent Authors and Most Influential Journals

RQ2 identified the top 10 authors and journals. Results showed a considerable increase in nursing chatbot/ChatGPT exposure and use. Liesbet Van Bulck and Philip Moons are the most prolific nursing journal authors. Both are from Katholieke Universiteit Leuven's Academic Centre for Nursing and Midwifery. Both authors found that ChatGPT can enhance patient information, but it needs more fine-tuning and cautious use to ensure reliability and safety.[46] The top journal is Nurse Educators with 11 publications. The current issues of this journal are focusing on AI, immersive learning, and big data in healthcare,[47] and the trends were consistent for the previous issues. Therefore, this might contribute to the high number of relevant journals in this theme. The identification of prominent authors and journals offers useful information about the key players in this field. The fact that the top authors are from a diverse range of countries and institutions suggests that this is a global area of research. The limited collaboration between research groups, as revealed by the co-authorship analysis, suggests that there is an opportunity for greater collaboration to advance the field more effectively. The prominence of journals focused on nursing education suggests that this is a key area of application for chatbots and ChatGPT in nursing.

RQ3: Institutions Involved in Chatbot/ChatGPT Research

US publications promote ChatGPT advancements the most based on RQ3 geography. Despite its restriction in China, nursing education researchers are interested in ChatGPT, an alternative AI chatbot.[48] Thus, this nation has conducted more chatbot research to boost learning. Investing in AI institutes and using premier university

research keeps the US ahead in AI. Certainly, both governments believe AI is essential for scientific and economic superiority.[49] The geographical distribution of research activity, with a concentration in Europe and North America, is consistent with broader trends in scientific research. The involvement of a diverse range of institutions, from universities to private consultants, suggests that the research in this field is being driven by a variety of stakeholders. The strong presence of universities in the top contributing institutions highlights the important role of academic research in advancing this field.

RQ4: Effects of Chatbot/ChatGPT on the Nursing Field

For the RQ4, experts from various disciplines contributed insights, noting both the technology's potential benefits and limitations. Opinions differ on whether ChatGPT should be restricted or legislated. Based on the culmination of the discussion, it was concluded that there is a dire need for further research in areas such as necessary skills for handling AI, biases in training datasets, optimal human-AI task combinations, text accuracy assessment, and ethical considerations. Although AI has the potential to aid in the process of drafting and editing, it is incapable of assuming moral, legal, and ethical obligations.[40] The citation network analysis reveals that the research in this field is organized around three main themes: patient education, nursing education, and ethical and professional implications. This suggests that the research is addressing a wide range of issues related to the use of chatbots and ChatGPT in nursing. The findings of the studies included in the citation network suggest that chatbots and ChatGPT have the potential to have a positive impact on the nursing field, but that there are also a number of challenges and ethical considerations that need to be addressed.

Utilising ChatGPT in the field of nursing presents ethical dilemmas that have the potential to compromise the fundamental principles of nursing.[35] However, incorporating artificial intelligence (AI) into nursing research, education, and practice also holds promise for progress. Given the expanding presence of AI technologies, it is crucial for nursing researchers and educators to actively participate in thoughtful discussions and philosophical analyses of the consequences, ethical considerations, and possible disadvantages related to the use of AI in nursing settings.[34] Hence, according to O'Connor,[38] it is important to educate nursing students on the importance of academic integrity and the value of gaining information and skills via extensive reading, analytical thinking, and scientific writing. These skills can be employed in a nurse's professional vocation to improve patient care and the delivery of healthcare services.

Due to the fact that the area of cardiovascular nursing and allied health is continuously undergoing development, it will be essential for healthcare workers to remain current with the most recent technologies and methods, including artificial intelligence (AI) language models like ChatGPT.[37] In a study,[36] the ChatGPT model may help nurses complete routine tasks, but it cannot replace the personal and emotional support they provide to patients and their vital role in patient assessment, treatment planning, and care coordination. Technology and robotics will likely be used in nursing to enhance patient outcomes, efficiency, and eliminate mistakes. Another study also noticed that the nurses must keep informed and adapt to new technology and innovations in the profession to benefit patients and improve their skills and expertise, making their work easier and more efficient.[36] Therefore, ChatGPT offers the potential to reduce the need for repetitive writing and administrative tasks, such as summarising extensive patient information lists.[39] Furthermore, it may encompass case summaries or care plans that outline nurse interventions specifically targeted to the unique needs of the patient. It has the capacity to enhance communication by providing cues for interaction between nurses and patients.

CONCLUSION

This bibliometric analysis provides a comprehensive overview of the current state of research on the use of chatbots and ChatGPT in the nursing field. The findings reveal a rapidly growing and dynamic field of research, with a diverse range of authors, institutions, and research

themes. The study highlights the potential of chatbots and ChatGPT to transform nursing education and practice, while also acknowledging the challenges and ethical considerations that need to be addressed.

Despite its thoroughness, this study has limitations. The conclusions may have been limited by using certain databases to omit relevant research from other sources. The omission of non-English articles may have missed important research in other languages. The study's concentration on publications with at least 17 citations may have missed promising but under-cited research. AI technology evolves quickly; therefore, some discoveries may become outdated.

The study's findings lead to the following recommendations for future research:
- Develop and evaluate frameworks for integrating chatbots and ChatGPT into nursing curriculum. Nursing curriculum should include AI literacy modules to equip students with the knowledge and skills to use these technologies effectively and ethically.
- Investigate the long-term impacts of chatbots and ChatGPT on patient care. Research is needed to assess the impact of these technologies on patient outcomes, patient safety, and the nurse-patient relationship.
- Establish guidelines for the ethical use of chatbots and ChatGPT in clinical simulations and practice. Clear guidelines are needed to ensure that these technologies are used in a way that is consistent with professional nursing standards and values.
- Promote interdisciplinary collaboration to advance research in this field. Collaboration between nurses, computer scientists, ethicists, and other stakeholders is essential to address the complex challenges and opportunities associated with the use of chatbots and ChatGPT in nursing.

In conclusion, this study contributes to the growing body of literature on the use of AI in nursing by providing a comprehensive overview of the emerging field of chatbot and ChatGPT research. The findings of this study can be used to inform future research, practice, and policy in this important area.

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