



Trends in research on clinical reasoning in nursing over the past 20 years: a bibliometric analysis

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Abstract

Purpose: Clinical reasoning is an essential component of nursing education. This study aimed to identify the trends in research on clinical reasoning in nursing over a 22-year period.

Methods: The Web of Science Core Collection was used as the target database, with the search terms “clinical reasoning,” “clinical judgement,” and “clinical decision.” The scope of the search included the subject, abstract, author’s keywords, and Keywords Plus for each article. Our literature search included journal articles from 2000 to 2021, with the subject area restricted to nursing. A total of 4,675 articles met the inclusion criteria after the removal of duplicates using digital object identifier. We used bibliometric analyses to conduct quantitative and statistical analyses of publication trends, the journals and countries with the most publications, the most productive authors, the most globally cited documents, and the most frequent keywords.

Results: In nursing, studies related to clinical reasoning have increased significantly since 2000. The most prolific country has been the United States. The journal with the most publications was the *Journal of Clinical Nursing*. The most productive author was Considine J, with 23 publications. The most widely cited author was Tanner CA, with 614 citations. The most frequent keywords in the literature related to clinical reasoning were “care,” “nurses,” and “decision-making,” in that order.

Conclusion: This study examined the quantitative analysis and statistics of publications related to clinical reasoning in nursing in the past 20 years using bibliographic information. This study can help guide future research on clinical reasoning for nurse educators.

Keywords

Clinical reasoning; Bibliometrics; Nursing; Education

Received: June 18, 2022

Accepted: July 24, 2022

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Introduction

Background

Competence in clinical reasoning is essential for nurses when they make judgements and decisions in their clinical practice. Nurses with competence in clinical reasoning better understand complicated clinical situations and solve problems more successfully [1,2]. Novice nurses may lack the ability to fully grasp patient cues [3], while experienced nurses with high clinical reasoning skills can more accurately analyze a patient's health status and provide appropriate care [4].

Clinical reasoning is important not only in clinical practice, but also in nursing education. Nursing students must acquire clinical reasoning skills before entering clinical practice as an RN to make safe and precise clinical judgements [5]. The Korea Accreditation Board of Nursing Education [6] identified clinical reasoning competence as an essential nursing program outcome for nursing students when they graduate.

Clinical reasoning is a dynamic thought process that enables one to identify, systematically analyze, interpret, and logically evaluate a patient's clinical status so that health care providers can form a conclusion [7]. "Clinical reasoning" has often been used interchangeably in the literature with concepts such as clinical judgement, critical thinking, and decision-making [8]. Many studies have analyzed the conceptual similarities and differences among these terms [3,4,9,10].

Clinical reasoning requires the ability to think deliberately about a clinical situation within a specific context [3]. Clinical reasoning evolves from a nurse's scientific and professional knowledge and includes ethical decisions and values [9]. Clinical reasoning also derives from critical thinking, which engages skills and attitudes based on existing information and context [9]. Clinical judgement is the ability to recognize cues in a clinical situation, generate and verify hypotheses, intervene and evaluate outcomes to achieve satisfactory clinical results [11]. The National Council of State Boards of Nursing [12] stated that clinical judgement is the observable outcome of embedded thought processes like critical thinking and decision-making. Clinical judgement refers to decision-making in a clinical situation. Although both clinical reasoning and clinical judgement are cognitive processes, clinical judgement differs in that it comprises a final decision or result [13]. Critical thinking is a concept applicable to all general situations, but clinical reasoning and clinical judgement are employed specifically in clinical situations [13]. In conclusion, critical thinking is a support tool for clinical reasoning, whereas clinical judgement is a result of the clinical reasoning process [7,14].

Bibliometric analysis is a research method for examining and analyzing large volumes of scientific data using quantitative methods [15]. Bibliometric studies explore publication

patterns, trends, new emerging areas of research, and gaps in research, and identify authors, institutions, and countries that have contributed the most to the development of a field [16].

Citation analysis is a commonly used bibliometric method using journal impact factors and individual author metrics such as the h-index [16]. Bibliometric analysis has been increasingly popular in nursing [15]. There were less than 10 total bibliometric nursing studies in the Web of Science before 2010, whereas more than 10 studies have been published every year since 2017, 144 studies so far. Studies have explored the following research topics: most prolific countries, number of articles by institutions and countries, number of citations, authors and their collaborations, impact factors, and popular topics within the research area of interest [17].

To date, no study has used bibliometric analysis to study clinical reasoning in nursing. However, several studies have used similar method such as bibliographic searches [9], systematic reviews [4], and scoping reviews [18]. Although similar, in that they analyzed studies on clinical reasoning, they were different from this study because they conducted in-depth reviews of a small number of studies [4,9] or included clinical reasoning in other health professions [18]. Since clinical reasoning is regarded as an important competence for nurses and nursing students, it is important to investigate the trends in research on clinical reasoning in the field of nursing using bibliometric analysis.

Objectives

This study presents a comprehensive picture of clinical reasoning research by analyzing papers published during a limited time span. Bibliometric analysis was employed to explore general bibliographic information, as well as publication growth, the countries with the most publication, the journals with the most publications and citations, leading authors, the most globally cited documents, and the most frequent author keywords, and a Keywords Plus analysis in clinical reasoning research.

Methods

Ethics statement

This study conducted bibliometric analysis of published documents. Ethical review was exempted for this study from institutional review board (IRB) committee of the university one of the authors belong to (IRB No: 2-7008132-A-N-01).

Study design

This was a retrospective descriptive study using bibliometric analysis.

Data source/measurement

This study followed a three-step process. The first step was retrieving data. The search was conducted in the Web of Science Core Collection database using the Science Citation Index-Expanded, Conference Proceedings Citation Index-Science, and Conference Proceedings Citation Index-Social Sci-

ence Humanities on October 9, 2021. In our search for studies related to clinical reasoning in nursing, the search terms “clinical reasoning” was conceptually related to “clinical decision” and “clinical judgement,” all of which were used in the search syntax. The search field included titles, abstracts, author keywords, and Keyword Plus in the category of nursing. The search included publications from 2000 to 2021 and generated 5,486 documents.

The second step was screening the retrieved data. Bibliographic information (i.e., publication title, source title, publication type, abstract, publication years, and references) from the 5,486 documents was exported into Excel file. After removing duplicates using digital object identifiers, 4,675 documents were obtained.

The last step was analyzing the data. Bibliometric analysis was conducted using the open-source Bibliometrix R package [19] to obtain information on annual scientific production, the most productive countries, the most relevant journals, the authors with the most publications, the documents with the most citations, the most relevant keywords, and Keywords Plus analysis from the bibliographic data.

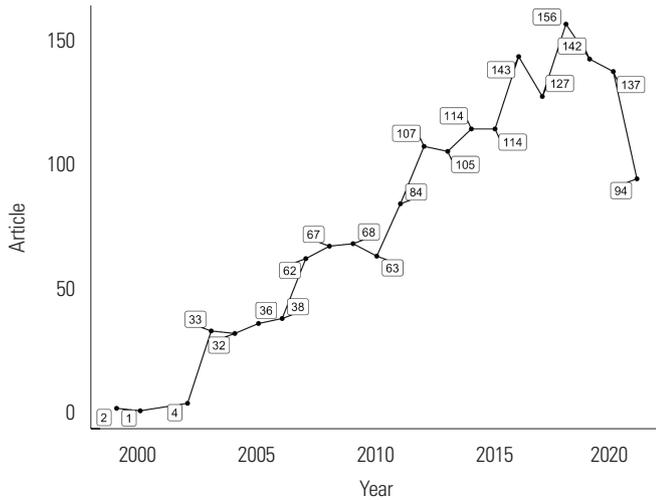


Fig. 1. Annual scientific production of articles on clinical reasoning.

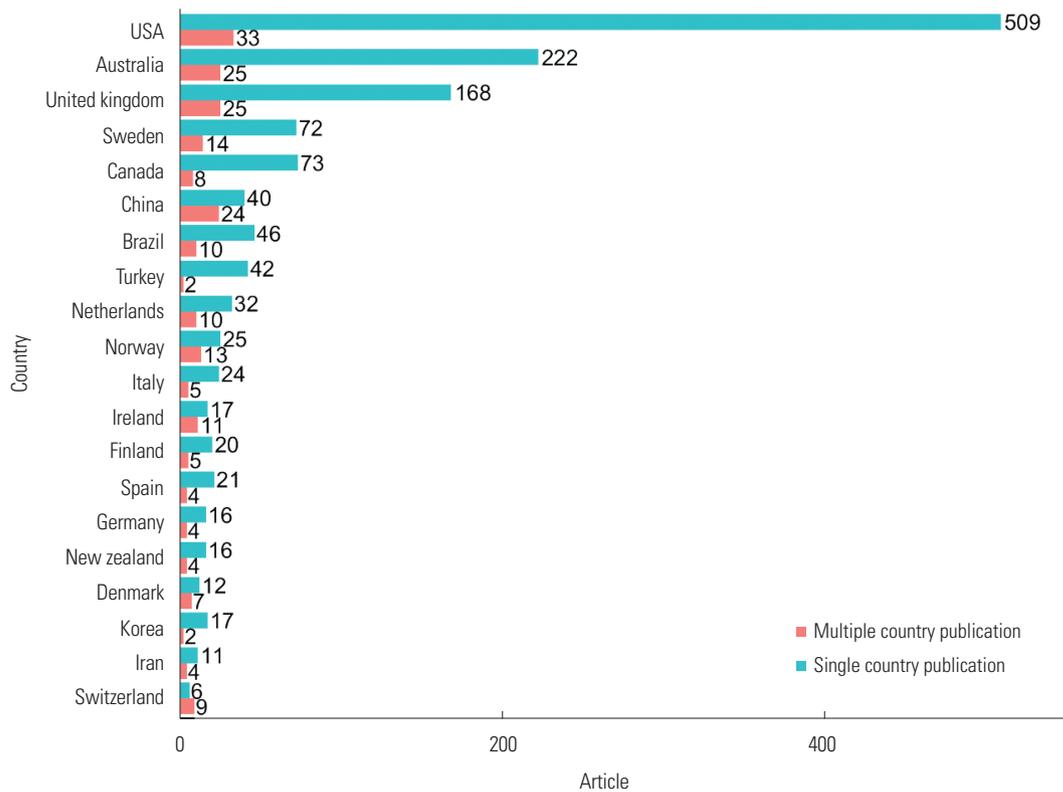


Fig. 2. Countries with the most publications related to clinical reasoning.

Results

General description of retrieved publications

Among a total of 4,675 studies, the document types were published 4,552 original articles (97.4%), 98 early-access original articles (2.1%), and 25 proceedings papers (0.5%). The average number of citations per document was 13.63 and the average number of citations per year per document was 1.57.

Growth of publications

The number of published studies related to clinical reasoning in nursing increased from 2000 to 2021 (increasing trend, $P=0.001$, Cox-Stuart test for trend analysis). Excluding 2021, the year with the most publications was 2018 ($n=390$) (Fig. 1). The yearly number of publications increased to more than 100 in 2006, more than 200 in 2010, and more than 300 in

2015. The year 2018 was the most productive (Fig. 1).

Top countries

Fig. 2 presents the 10 countries with the most publications related to clinical reasoning. Looking at single-country publications (SCPs) and multiple-country publications (MCPs), SCPs were relatively dominant compared to MCPs. The countries with the most SCPs were the United States, Australia, and the United Kingdom, in that order. The country with the most MCPs was the USA, with the UK and Australia tied in second place. As Asian countries, China ranked sixth and Korea ranked 18th.

Top journals

A total of 4,675 documents were produced in 130 sources including journals and books. Table 1 presents the top 10 journals with the most publications, which account for 53.45% of all

Table 1. Top 10 journals with the highest production of articles on clinical reasoning in nursing

Rank	Journal name	h-index	TC	No	PY
1	Journal of Clinical Nursing	48	12,879	816	2003
2	Journal of Advanced Nursing	47	7,007	259	2003
3	Nurse Education Today	33	3,919	231	2003
4	Journal of Nursing Education	26	2,851	142	2006
5	International Journal of Nursing Studies	33	2,678	126	2003
6	Nursing Ethics	19	1,154	114	2003
7	Computers, Informatics, Nursing	17	1,055	110	2002
8	Nurse Education in Practice	16	829	107	2013
9	Clinical simulation in Nursing	20	1,572	104	2011
10	Journal of Nursing Scholarship	24	1,760	98	2004

TC, total citations; No, number of publications; PY, year of first publication.

Table 2. Top 10 authors with the highest production of articles on clinical reasoning in nursing

Rank	Author	Affiliation	h-index	TC	No	PY
1	Considine J	Deakin University, Australia	10	309	23	2007
2	Bucknall T	Deakin University, Australia	10	540	22	2003
3	Lasater K	Edinburgh Napier University, UK	10	531	18	2007
4	Lopes MV	Universidade Federal do Ceara, Brazil	5	61	17	2009
5	Manias E	Deakin University, Australia	12	318	17	2003
6	Thompson C	University of Leeds, UK	11	433	17	2003
7	Chaboyer W	Griffith University, Australia	11	403	16	2010
8	Palese A	University of Udine, Italy	5	61	16	2007
9	Cooper S	Federation University, Australia	11	433	15	2006
10	Jackson D	University of Technology Sydney, Australia	8	205	15	2007

TC, total citation; No, number of publications; PY, year of first publication.

Table 3. Top 10 articles on clinical reasoning in nursing based on global citations

Rank	Article	TC
1	Tanner CA. Thinking like a nurse: a research-based model of clinical judgment in nursing. <i>J Nurs Educ</i> 2006;45:204–11. https://doi.org/10.3928/01484834-20060601-04	614
2	Rycroft-Malone J. What counts as evidence in evidence-based practice? <i>J Adv Nurs</i> 2004;47:81–90. https://doi.org/10.1111/j.1365-2648.2004.03068.x	494
3	Pravikoff DS. Readiness of U.S. nurses for evidence-based practice: many don't understand or value research and have had little or no training to help them find evidence on which to base their practice. <i>Am J Nurs</i> 2005;105:40–51. https://doi.org/10.1097/00000446-200509000-00025	374
4	Santos CM. The PICO strategy for the research question construction and evidence search. <i>Rev Lat Am Enfermagem</i> 2007;15:508–11. https://doi.org/10.1590/s0104-11692007000300023	349
5	Anderson RA. Nursing homes as complex adaptive systems: relationship between management practice and resident outcomes. <i>Nurs Res</i> 2003;52:12–21. https://doi.org/10.1097/00006199-200301000-00003	288
6	Melnyk BM. The state of evidence-based practice in US nurses: critical implications for nurse leaders and educators. <i>J Nurs Adm</i> 2012;42:410–7. https://doi.org/10.1097/NNA.0b013e3182664e0a	282
7	Lasater K. High-fidelity simulation and the development of clinical judgment: Students' experiences. <i>J Nurs Educ</i> 2007;46:269–76. https://doi.org/10.3928/01484834-20070601-06	236
8	Xyrichis A. Teamwork: a concept analysis. <i>J Adv Nurs</i> 2008;61:232–41. https://doi.org/10.1111/j.1365-2648.2007.04496.x	200
9	Harvey N. Nominal group technique: an effective method for obtaining group consensus. <i>Int J Nurs Pract</i> 2012;18:188–94. https://doi.org/10.1111/j.1440-172X.2012.02017.x	198
10	Levett-Jones T. Staff – student relationships and their impact on nursing students' belongingness and learning. <i>J Adv Nurs</i> 2009;65:316–24. https://doi.org/10.1111/j.1365-2648.2008.04865.x	187

TC, total citations.

publications. The *Journal of Clinical Nursing* recorded the most publications (816) and citations (12,879), followed by the *Journal of Advanced Nursing* (259 articles and 7,007 citations) and *Nurse Education Today* (231 articles and 3,919 citations).

The most productive authors

In total, 14,015 authors contributed to the retrieved documents. Among them, there were 566 single-author documents. The average number of articles per author was 0.33, and the average number of authors per document was 3.00. Table 2 shows the top 10 productive authors. The most productive author was Considine J, with 23 publications. Each of the top 10 authors produced 15 or more documents. Of the total 4,675 articles, 176 articles (3.7%) were written by the top 10 authors and 4,109 publications (87.9%) were multiauthored. The number of coauthors per document was 3.86 and the collaboration index was 3.28.

The most globally cited documents

Table 3 presents the documents with the most global citations. The most globally cited article was “Thinking like a nurse: a research-based model of clinical judgment in nursing” written by Tanner CA in 2006 published in the *Journal of Nursing Education* with 614 total citations. Tanner CA reviewed nearly 200

studies on clinical judgement in nursing and presented a clinical judgement model based on the reviewed studies. The second most cited document was written by Rycroft-Malone J in 2004 in the *Journal of Advanced Nursing*. The third was by Pravikoff DS in 2005 in the *American Journal of Nursing*.

The most frequent keywords

Keyword analysis was done with 8,646 keywords chosen by the authors. Among them, the most frequently encountered author keywords were “care” (n = 620 occurrences), “nurses” (n = 446), “decision-making” (n = 318), “education” (n = 278), “management” (n = 242), “experiences” (n = 241), “outcomes” (n = 238), “perception” (n = 234), “health” (n = 214), and “model” (n = 212), in that order (Fig. 3).

Keywords Plus analysis

Fig. 4 shows two clusters of Keywords Plus for clinical reasoning in nursing. In addition to the original keywords provided by the author, Keywords Plus are derived from the titles of the references of an article based on a special algorithm. Compared to keywords, Keywords Plus are more broadly descriptive but less comprehensive in describing the content of a particular article [20]. In Fig. 4, the word cluster on the left is centered on the word “care,” and the keywords surrounding it,

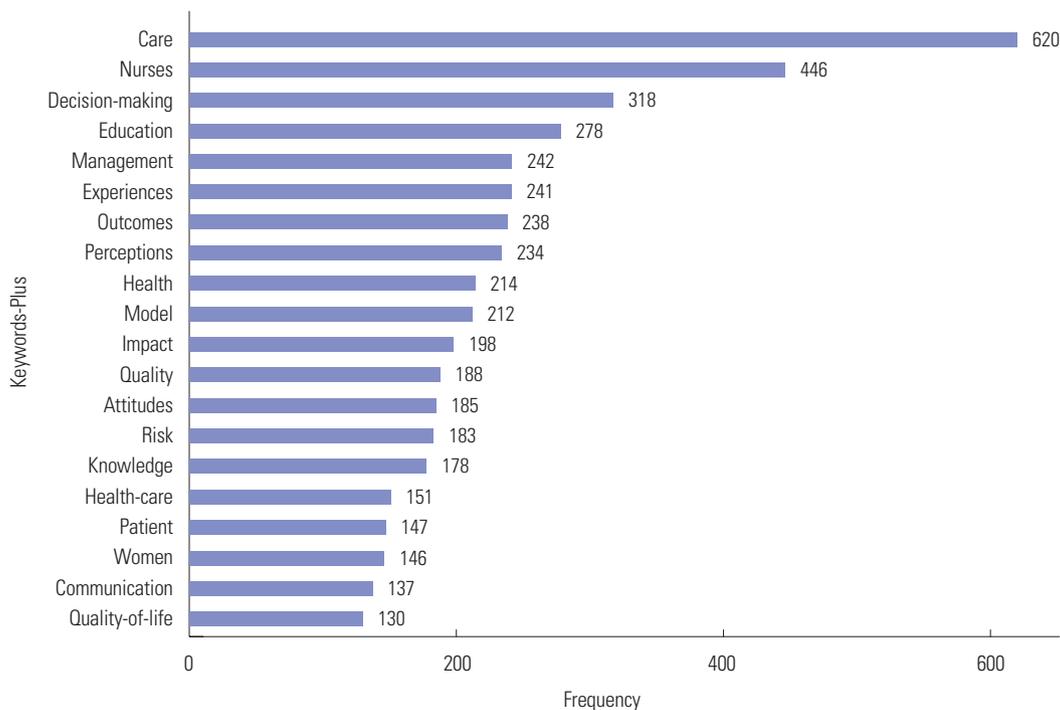


Fig. 3. Most relevant keywords for the topic of clinical reasoning in nursing.

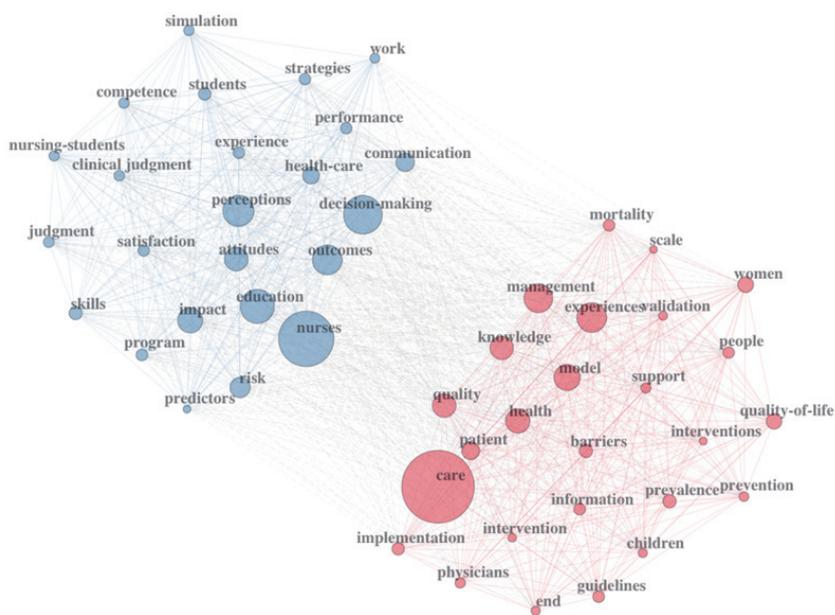


Fig. 4. Keywords Plus network analysis of clinical reasoning in nursing.

are in order from highest to lowest, “perception,” “management,” “experience,” “quality,” and “communication,” with the concept of “care” presented nearby. In the cluster on the right, the keywords “nurse,” “decision-making,” “education,” “outcomes,” “model,” “knowledge,” and “attitude” are also present

ed in order from highest to lowest. The concepts on the left reflect the experiences and interactions that are considered important in care, and the concepts on the right are related to the attributes and abilities that nurses should have.

Discussion

Interpretation

The most frequent keywords retrieved from the 4,675 published articles were “care,” “nurses,” “decision-making,” and “education,” in that order. The Keyword Plus network suggested “decision-making,” “education,” “outcomes,” “model,” “knowledge,” and “attitude” as keywords related to “nurse.” This aligns with the study by da Silva Bastos Cerullo and de Almeida Lopes Monteiro da Cruz [9], which stressed professional knowledge and ethical decision-making in the development of clinical reasoning by nurses. A systematic review by Cappelletti et al. [4] also supports the results of Keyword Plus network analysis by suggesting that clinical reasoning is an essential element in nurses’ decision-making process, and that education and experience significantly improve it.

Comparison with previous studies

There were three studies similar to ours. First, da Silva Bastos Cerullo and de Almeida Lopes Monteiro da Cruz [9] conducted a bibliographic search on clinical reasoning, and extracted 25 articles and analyzing them by reviewing the full texts. They reported that clinical reasoning originated from scientific and professional knowledge and reflected nurses’ ethics and values. The second was a systematic review by Cappelletti et al. [4]. A total of 2,353 research papers were identified in an electronic database by searching “clinical reasoning [and] nursing” and “clinical judgement [and] nursing.” After removing overlapping studies, 15 were reviewed. They reported that knowledge was the most effective strategy for promoting clinical reasoning and critical judgement, and that experience was also necessary in decision-making. The bibliographic search by da Silva Bastos Cerullo and de Almeida Lopes Monteiro da Cruz [9] and the systematic review by Cappelletti et al. [4] were similar to bibliometric analysis in regard to the extraction of related literatures from search engines. However, their goals were more similar to systematic reviews in terms of their in-depth analysis of clinical reasoning concepts. The third was a scoping review by Young et al. [18], which mapped the literature on clinical reasoning within health professions using seven databases. As a result, 110 different terms were derived to describe the concepts related to clinical reasoning in various health professions. They analyzed the concepts comprehensively, focusing on bibliometric characteristics and the use of varied terminology related to clinical reasoning. That study differed from our study in that it was not limited to nursing, but included studies from a variety of health professions, and analyzed various concept terminologies.

Suggestions for further studies

Clinical reasoning is required to solve the health problems of patients in clinical situations using evidence-based nursing interventions [10]. Nursing science deals with problems in clinical situations; therefore, related research on clinical reasoning should be conducted in the future. The terms “clinical reasoning” and “clinical judgement” were registered as Medical Subjective Headings in 2021, making this study timely and meaningful.

Limitations

Bibliometric analysis is a scientific and meaningful methodology that examines the trend of research using bibliographic information in the field. However, it has methodological limitations, such as database bias. Journal articles in data bases other than Web of Science and articles published after October 9, 2021 were not included in this analysis. Therefore, we acknowledge that the articles included in this study do not represent the complete literature available on clinical reasoning. Nonetheless, the results of this review provide a broad view of clinical reasoning in nursing.

Conclusion

The bibliographic analysis in this study provides nursing researchers with significant information on research trends related to clinical reasoning in the last 22 years. This study is meaningful because it is the first research to use bibliometric analysis to examine the research trends of clinical reasoning in nursing. Future active research on clinical reasoning could further integrate such knowledge into nursing practice.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Funding

The authors received no financial support for this article.

Data Availability

Please contact the corresponding author for data availability, because Clarivate does not allow researchers to share the data retrieved from the Web of Science.

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