A bibliometric analysis of core articles of international nursing research frontiers based on the Web of Science database

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Abstract: Objective: To review and analyze the basic information and distribution of core articles in the global research frontier of nursing, so as to ascertain the current trend in the field.

Methods: A total of 37 highly cited essential science indicator (ESI) papers in the nursing discipline were retrieved, which were compared with the core article collection of the ESI research frontier in January 2019 to understand the current nursing research frontiers. Subsequently, a statistical analysis of the core articles that constituted the nursing research frontiers was performed using a bibliometric method. The analysis was conducted with multiple aspects including the number of core articles, total number of citations, average publication year, issuing country, participating institution, citing paper, journal distribution, and core researcher.

Results: At present, the two international research frontiers of nursing are patient-centered care (Research Frontier 1) and missed care (Research Frontier 2). These two frontiers include a total of 12 core articles, 6 of which are highly cited Web of Science-indexed nursing papers. Research Frontier 1 includes three core articles that were cited 389 times. Research Frontier 2 includes nine core articles that were cited 841 times. Articles in the two frontiers were cited by 454 and 841 papers, respectively, most of which are in the United States. In addition, the 12 core articles were published across eight journals, the impact factors of which are all relatively high. Lastly, Research Frontier 1 involves 11 authors, whereas Research Frontier 2 involves 49 authors, of which seven authors have published more than two articles.

Conclusions: The core articles in the frontier of international nursing research demonstrate distinctive features in their issuing country/region, journal distribution, and participating institution. Review and analysis of the core articles of international nursing research frontiers can help nursing staff understand the current research hotspots and consequently perform corresponding scientific research to promote the development of the nursing discipline.

Keywords: nursing • core article • research frontier • bibliometrics • highly cited paper

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1. Introduction

In recent decades, the value of research has been increasingly emphasized in the nursing discipline.\textsuperscript{1} With the development of nursing education in China, the core competence of nursing staff has substantially improved,\textsuperscript{2} thereby creating a mature environment for the comprehensive research and development of nursing. However, at present, many nursing staff lack an understanding of the current status of domestic and international nursing
research and cannot identify a starting point for relevant research. Therefore, it is necessary to adopt scientific methods to explore nursing research hotspots and help nursing researchers identify a suitable research direction, so as to promote the development of the nursing discipline. Bibliometric indicators, as the indicators that are used to objectively and quantitatively evaluate the performances and research patterns of authors, journals, countries, and research institutions, are widely used in various research fields. They can reveal key issues, the latest developments, current gaps, and future directions of a specific research area. A “Hotspot,” or “Frontier,” refers to the popular topics and the latest research fields or issues within a certain range during a certain period. A research frontier is composed of a group of highly cited papers that are either frequently co-cited or cited as a group. The degree of their association in the co-citation is often decided by the citing article. Frontier studies in the nursing field are extremely important for its development, as analysis of the co-citation of articles in this field can reveal the most influential developmental direction of the current research trends. However, existing studies have barely analyzed nursing research frontiers. In this study, by comparing highly cited essential science indicator (ESI) papers in the nursing discipline with the core article collection of global research frontiers, we identified the characteristics of latest international research frontiers related to the nursing field and their core articles.

2. Methods

2.1. Data source

On February 18, 2019, based on the ESI data updated on January 2019, using “Nursing” as the key discipline in the Web of Science (WOS) database, we searched highly cited ESI nursing papers collected in the SCIE and SSCI databases between 2008 and 2018. The retrieved papers were subsequently compared with the core article collection of the ESI research frontiers in January 2019, to identify global nursing research frontiers supported by highly cited papers.

2.2. Determination of highly cited papers

Highly cited papers were determined by ranking the number of citations of all publications in an ESI discipline during the same year from high to low, and selecting the top 1% of the papers that were most cited.

2.3. Statistical analysis

Statistical analysis was performed on core articles of the nursing research frontier in terms of the number of core articles, total number of citations, average publication year, issuing country, participating institution, citing paper, journal distribution, and core researcher. The resultant data were imported into Excel 2013 to establish a database. A descriptive analysis was subsequently conducted using parameters such as frequency and percentage.

3. Results

3.1. Number of highly cited papers and their participations in global research frontiers

According to the ESI data in January 2019, the nursing discipline has seen the publication of 37 highly cited papers in 11 years. Among them, six papers have participated in two global research frontiers, which are, “patient-centered care; literatures; systematic; integrative model,” or “patient-centered care,” which is hereinafter referred to as “Research Frontier 1”; and “nursing care left undone; missed nursing care terminologies; care left undone; unfinished nursing care; missed care,” or “missed care,” which is hereinafter referred to as “Research Frontier 2.”

3.2. Comprehensive information of Research Frontier 1

3.2.1. Basic information

Research Frontier 1 was composed of three core articles, including one highly cited nursing paper. The total number of citations was 389, and the average publication year was 2003.

3.2.2. Country and area distribution

Among the three core articles of Research Frontier 1, one was published by Australian authors, one by authors of the United Kingdom, and the last one was jointly written by authors of Germany and the United States.

3.2.3. Participating institution

A total of six institutions participated in the publication of the core articles in Research Frontier 1, including the University of Oxford, University of Missouri System, University of Missouri Columbia, University of Hamburg, University of Adelaide, and Royal Adelaide Hospital, all of which contributed one publication, respectively.

3.2.4. Citing papers

As of March 15, 2019, the three core articles constituting Research Frontier 1 have been cited by a total
of 454 papers (In November 2011, the three articles were cited 389 times, whereas on February 19, 2019, these papers were cited 454 times. The considerable increase in the number of citations was due to the daily update of the Web of Science™ core paper collection database). The results indicate that the United States contributed the most citations, accounting for 24.23% of all citations, followed by Australia (22.25%), the United Kingdom (16.08%), and Canada (14.54%). In addition, these core articles were also cited by 48 other countries such as Sweden, the Netherlands, and Germany. The distribution information of countries and regions that contributed over 10 citations is shown in Figure 1. Alternatively, when analyzing the data from the perspective of citing institutions, the University of Toronto contributed the largest number of citations, accounting for 4.41% of the 454 citations. Other institutions that provided a considerable number of citations included Griffith University, Uppsala University, University of Queensland, and University of London. The 13 institutions that contributed more than 10 citations are listed in Figure 2.

3.2.5. Journal distribution
The three core articles that belong to Research Frontier 1 were published in three different journals collected in the Web of Science™ core article collection database, as listed in Table 1.

3.2.6. Core researcher
The core articles in Research Frontier 1 were published by a total of 11 authors, who come from five research institutions and hospitals, including the University of Adelaide, University of Missouri Columbia, University of Hamburg, Royal Adelaide Hospital, and University of Oxford.
3.3. Comprehensive information of Research Frontier 2

3.3.1. Basic information
Research Frontier 2 was composed of nine core articles, including five highly cited nursing papers. The total number of citations was 841, and the average publication year was 2015.

3.3.2. Country and area distribution
The authors of the United Kingdom contributed eight core articles to this research frontier, followed by authors of the United States and Belgium, which published six and five core articles, respectively. The information of countries which contributed to the core articles of Research Frontier 2 is shown in Figure 3.

| Journal                          | Number of published core article | Impact factor | WOS discipline          | Division |
|----------------------------------|----------------------------------|---------------|--------------------------|----------|
| PLoS One                         | 1                                | 2.766         | Multidisciplinary Sciences | Q1       |
| Medical Care Research and Review | 1                                | 2.315         | Health Care Sciences & Services | Q2       |
| Journal of Advanced Nursing       | 1                                | 2.267         | Nursing                  | Q1       |

Note: The impact factors are quoted from the latest 2017 ICR published in June 2018. The division information is quoted from the latest 2017 JCR published in June 2018.

Table 1. Journal distribution of Research Frontier 1.

3.3.3. Participating institution
Seven institutions participated in the research work of Research Frontier 2 and published more than two core articles. Among them, five institutions, including the University of Southampton, University of Pennsylvania, University of London, King’s College London, and Catholic University of Leuven, participated in the publication of five articles, while Technical University of Berlin and Karolinska Institute both participated in the publication of three articles. Details of the results are shown in Figure 4.

3.3.4. Citing papers
The nine core articles constituting Research Frontier 2 were cited by a total of 905 papers. The results indicate that the United States contributed the most citations, accounting for 22.65% of all citations, followed by the United Kingdom (16.46%), Australia (8.51%), and Sweden (7.62%). In addition, these core articles were cited by 68 other countries, such as Germany, Italy, and New Zealand. The distribution information of countries and regions that contributed over 10 citations is shown in Figure 5. Alternatively, when analyzing the data from the perspective of citing institutions, the University of Pennsylvania contributed the largest number of citations, accounting for 4.42% of the 454 citations. Other institutions that provided a considerable number of citations included the University of London, University of Southampton, Karolinska Institute, King’s College London, University of Basel, Uppsala University, University of Eastern Finland, Catholic University of Leuven, and New York University. The top 10 institutions that contributed the most citations are listed in Figure 6.
Figure 4: Information of participating institutions which contributed to Research Frontier 2.

Figure 5: Information of the top 10 countries that contributed the most citations to Research Frontier 2.

Figure 6: Information of the top 10 institutions that contributed the most citations to Research Frontier 2.
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| Journal                          | Number of published core article | Impact factor | WOS discipline                  | Division |
|----------------------------------|----------------------------------|---------------|----------------------------------|----------|
| BMJ Quality Safety               | 3                                | 7.226         | Health Care Sciences & Services  | Q1       |
| International Journal of Nursing Studies | 3                                | 3.656         | Nursing                          | Q1       |
| Assistenza Infermieristica E Ricerca | 1                                | 0.44          | Nursing                          | Q4       |
| Journal of Clinical Nursing       | 1                                | 1.635         | Nursing                          | Q2       |
| Lancet                           | 2                                | 53.254        | Medicine, General & Internal     | Q1       |

Table 2. Journal distribution of Research Frontier 2.

3.3.5. Journal distribution

The nine core articles that belong to Research Frontier 2 were published in five different journals collected in the Web of Science™ core article collection database, as listed in Table 2.

3.3.6. Core researcher

The core articles in Research Frontier 2 were published by a total of 49 authors. The seven authors who contributed more than two core articles come from four research institutions, including the Catholic University of Leuven, University of Southampton, King’s College London, and University of Pennsylvania.

4. Discussion

ESI is a basic science indicator database developed by the world-renowned Institute for Scientific Information (ISI), United States, in 2001, designed to provide basic analytical and evaluation tools for measuring scientific research performance and tracking scientific development trends. As a bibliometric analysis database established on the basis of over 10 million studies in more than 12,000 global academic journals collected by Thomson Reuters Corporation (SCIE/SSCI), ESI has become an important indicator tool that is adopted universally to evaluate the academic level and influence of worldwide universities, academic institutions, and countries and regions. As of January 2019, the ESI data suggest that although the 22 disciplines in the database have a total of 10,074 research frontiers, the nursing discipline only has two frontiers. This finding indicates that the highly cited papers of the nursing discipline are less active in participating in global research hotspots, which are to a certain degree a reflection of the small research scale of the discipline. The two international nursing research frontiers are as follows: patient-centered care and missing care, that is, care measures that should be applied, but are not implemented in a timely manner due to various reasons. Although the nursing discipline has entered the era of “health-centered care,”9 most of the nursing care is still oriented toward patients, and the majority of the nursing staff are still working at the clinical front line. There are also studies which reported that nurses are more concerned with patient-related problems.9 In addition, the correlation between the quality of care and patient outcome in patient-centered care remains unclear. For example, research on the effect of incomplete nursing care due to issues such as inadequate skills or inappropriate human resource allocations on patient outcome is still insufficient.16–19 Therefore, research on patient-centered care remains a leading research topic, while research on missing care is gradually garnering attention. These results suggest that future research should focus on improving clinical nursing work, enhancing the quality of care, and ensuring the safety of care. Furthermore, with an increasing demand for healthcare, nursing research should be developed to follow the trends and meet the healthcare needs of the entire society.

The participants in the nursing research frontiers are mainly from developed countries; most of the participating institutions are located in these areas as well. This is likely because the development of nursing research relies heavily on strong financial support and advanced medical technologies. Therefore, for the future of nursing research in China, it is necessary to increase the investment in scientific research, explore various funding channels, learn advanced medical technologies, and improve the overall healthcare level, as well as the scientific research quality. Furthermore, it is demonstrated that the research frontier participating institutions are predominantly the world’s top research-oriented comprehensive universities, which have long and exceptional academic traditions and contributed significantly to the output of scientific research results. This finding indicates that relying on institutions with a strong research culture to accurately grasp the latest research trend is essential for the advancement of nursing research. This study also found that the core researchers of the research frontier studies all come from the world’s top research-oriented comprehensive universities or world-renowned public teaching hospitals, as based in these institutions, the researchers are exposed to a broader scope and vision. Therefore, scientific researchers...
should widen their knowledge base and stay sensitive to knowledge frontiers. In addition, the native language of the core researchers is primarily English, which facilitates the international communication of the article. Therefore, it is recommended that nursing researchers improve their literacy, learn foreign languages, and strengthen their reading and writing abilities in foreign languages so that their research results can be productively communicated.

The country and region distributions of papers that cite the core articles of the research frontiers refer to the country and region distributions of the authors of the citing papers listed in the Web of Science core article collection database. The core articles in the research frontiers present superior quality, wide influence, and high recognition. The data from this study demonstrate that the nursing research frontiers pose the greatest influence on the United States, where the core articles are most recognized. Analysis of the distribution of institutions that cite the core articles can help us understand the influence of a research frontier on global institutions. Notably, some citing institutions are also those that have published core articles in the research frontier, indicating that the primary research institutions that participated in the research frontier have continuously followed up on the topic and consequently produced a series of results.

5. Conclusions

In this study, we identified the frontiers of international nursing research and performed statistical analysis of the basic information of the supporting core articles, thereby providing ideas for researchers to conduct studies in the relevant field. With the rapid development of medical statistics, nursing research has also entered the era of high-quality big data. Despite its wide application in the nursing discipline, bibliometrics has often been limited to investigate a specific aspect of the field, such as aged care, and emergency care, with only a few researchers focusing on a systematic study of nursing research frontiers. To address this issue, this study discussed the relevant issues to provide a theoretical reference. Due to rapidly developing research work and continuously advancing scientific and technological achievements worldwide, it is challenging to continuously monitor and grasp the trends of a field. However, the ability to track and understand the current research developments and master the most cutting-edge and attractive research trends can greatly facilitate research managers and decision-makers to make optimal decisions on resource and support allocation.

Ethical approval

Ethical issues are not involved in this paper.

Conflicts of interest

All contributing authors declare no conflicts of interest.

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