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Bibliometric analysis of six nursing journals from the Web of Science, 2012-2017.

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Abstract

Aim. The purpose of this study was to perform a bibliometric analysis of the six most important nursing journals according to the impact factor of the Science Citation Index through Web of Science®. The following journals were included: *International Journal of Nursing Studies*, *Nurse Education Today*, *Journal of Nursing Scholarship*, *Nursing Outlook*, *Worldviews on Evidence-Based Nursing* and the *Journal of Advanced Nursing*.

Background. In the nursing field, bibliometric analysis and maps have been used to analyse the production of some journals but not for the comparison of different journals.

Design/Method. Using descriptive bibliometrics, we studied scientific production of different journals and bibliometric maps were used to visualize the content of published articles.

Results. The six journals included showed that 3937 articles were written by 11371 authors from 2980 institutions and 84 countries from 2012 - 2017. *Journal of Advanced Nursing* had a greater number of publications and citations. The most prolific authors showed a tendency to publish first in *Journal of Advanced Nursing* and then in *International Journal of Nursing Studies* and *Nurse Education Today*. The frequency of citation was higher in *International Journal of Nursing Studies* followed by *Journal of Advanced Nursing*. The most collaborative

authors and those with the most co-citations published more than half of their publications in *Journal of Advanced Nursing*. The topics most commonly researched by these authors were job satisfaction, collaborative practices and nurse leaders.

Conclusion. This bibliometric analysis contributes to the understanding of the current state of nursing research and its evolution.

Keywords: bibliometric analysis, citation analysis, nursing, Science Citation Index, scientific production, Web of Science.

Why is this research needed?

- Bibliometric studies are important because they reveal important journal features, published topics, distributions, citations and authors.
- The study highlights the usefulness of bibliometric analysis in the nursing context.
- In the nursing field there are almost no studies of this type and no studies comparing the most important journals.
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What are the key findings?

- *Journal of Advanced Nursing* had a greater number of publications and citations than the other journals analysed.
- The most prolific authors showed a tendency to publish in *Journal of Advanced Nursing*.

- The citation frequency was highest in *International Journal of Nursing Studies*, followed by *Journal of Advanced Nursing*.
- *Journal of Advanced Nursing* includes the most collaborative authors with the highest number of citations.
- There were three main topics of research with their associated terms: patient, student and hospital.
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How should the findings be used to influence research?

- The results can be used to assess the current state of nursing research, so that the most relevant study topics in nursing can be identified to guide future research.
- The research revealed the most popular institutions and authors in the nursing field.
- The study shows how the most studied topics in the nursing context are related to patients and nursing students. There is a smaller number of studies carried out with nursing professionals. This is the reason why there seems to be a tendency to study aspects more related to nurses and their working environment.

INTRODUCTION

There are many studies on the different ways to classify nursing journals (Dougherty, Lin, McKenna, Seers, & Keeney, 2011; Mantzoukas, 2009). However, the "gold standard" of journal classification is attributed to Thompson Reuters through Journal Citation Reports (JCR®), which has a major impact on the publications of academics and researchers (Hunt, Happell, Chan, & Cleary, 2012; Polit & Northam, 2011). Based on this classification, there are a total of 109 journals in nursing, of which 32 belong to Quartile 1. Within this Quartile, the six most important journals (according to their impact factor) that address the issues that

advance evidence-based nursing to further knowledge for practice, education, management or policy in general are the *International Journal of Nursing Studies* (*IJNS*) (Impact Factor: 3.755), *Nurse Education Today* (*NET*) (Impact Factor: 2.533), the *Journal of Nursing Scholarship* (*JNS*) (Impact Factor: 2.396), *Nursing Outlook* (*NO*) (Impact Factor: 2.236), *Worldviews on Evidence-Based Nursing* (*WEBN*) (Impact Factor: 2.103) and the *Journal of Advanced Nursing* (*JAN*) (Impact Factor: 1.998). While there are other journals with higher impact factors that address broad fields of expertise, they address cardiovascular nursing, perinatal care, family nursing, cancer care or human lactation.

In the nursing field, bibliometric indicators are a fundamental tool to identify the number and distribution of publications, authorship, co-authorship and most cited articles (Haddad, 2017; Hunt, Jackson, Watson, & Cleary, 2013). These performance analyses and studies of the development of the journals of different countries (Blazun Vosner, Kokol, Bobek, Zeleznik, & Zavrsnik, 2016; Dubner, 2009; Fu & Ho, 2015; Smith & Watson, 2016; Tsay & Shu, 2011) represent an added value for journals. Accordingly, it is worth mentioning that there are no studies in the international nursing field that compare these bibliometric indicators of the most important international journals with the highest impact factor that address the generic nursing content.

This study will allow the readers from any region or country to understand the current state of nursing research and to identify the relevant topics, the most popular institutions and authors, for future nursing research.

Its findings can be transferred to any region or country because the research established all countries as inclusion criteria. Furthermore, we have clearly outlined the relevance of our manuscript with the aim of contributing to advances in research, practice and nursing education, this analysis will also contribute to improvements in the quality of health care, in the general nursing or nursing specialities. By allowing, among other things, to compare the most frequent topics in nursing research with the priority lines defended by experts and institutions (International Council of Nurses, World Health Organization).

Background

Bibliometrics can be defined as: "the quantitative study of published physical units, bibliographic units or both" (Broadus, 1987, p. 376). Bibliometric analysis and bibliometric mapping provide a means to evaluate academic production, publication and citation information to define parameters using statistical methods (Van Raan, 2004) and to identify specific research topics (Eck, 2011). Bibliometric analysis of these data was performed using the following programs: Hiscite (version 2010.12.6; HistCite Software LLC, New York, USA), Bibexcel (version 2011.02.03; Olle Persson, Umeå University, Umeå, SWE), Pajeck (version 3.14, 2013.11.12; Batagelj and Mrvar, University of Ljubljana, Ljubljana, Slovenia) and Vosviewer (Eck & Waltman (2013), Leiden University, the Netherlands).

The Histcite program (version 2010.12.6) allows for the identification of significant articles in searches by topics on the Web of Science, contributing to bibliometric analysis. The Global Citation Scores (GCS) was acquired by using HistCite. The construction of knowledge maps that show the frequency of occurrence and the relationships between terms can be completed with applications such as Bibexcel (version 2011.02.03) in combination

with Pajek (version 3.14) and Vosviewer, which allow for the visualization of the different bibliometric maps.

THE STUDY

Aims

The objective of this research is to perform a bibliometric analysis of the six most important nursing journals according to their Science Citation Index (SCI) impact factor through WoS (Web of Science®, Thomson Reuters, New York, USA) that address the generic nursing content. The aim of this study is to understand the current state of the journals and their evolution and to describe exactly the number of published articles, institutions, countries, authors, citations, most cited articles, analysis of terms, co-citations and co-authorships.

Design

Quantitative content analysis was implemented to study all the published research papers in the six general nursing journals for the years 2012-2017. The results were analysed using descriptive methods, descriptive bibliometric analysis and bibliometric mapping.

Data collection

The research was conducted from October 2017 - January 2018 in the WoS Core Collection database for each of the selected journals. The selection of the journals was determined according to their major impact factor and journals for specific nursing fields were excluded.

The following journals whose production is related to a specific nursing field were excluded from the study despite having a higher rank:

European Journal of Cardiovascular Nursing

Journal of Family Nursing

Birth-Issues in Perinatal Care

Women and Birth

Journal of Cardiovascular Nursing

European Journal of Cancer care

Journal of Human Lactation

Six journals were selected:

- *International Journal of Nursing Studies* (*IJNS*). ISSN: 0020-7489. 12 Issues/Year. Impact Factor: 2012 (2.075), 2013 (2.248), 2014(2.901), 2015(3.561) and 2016(3.755).
- *Nurse Education Today* (*NET*). ISSN: 0260-6917. 8 Issues/Year. Impact Factor: 2012(1.218), 2013(1.456), 2014(1.364), 2015(1.591) and 2016(2.533).
- *Journal of Nursing Scholarship* (*JNS*). Online ISSN: 1547-5069. 6 Issues/Year. Impact Factor: 2012(1.612), 2013(1.772), 2014(1.636), 2015(2.128) and 2016(2.396).
- *Nursing Outlook* (NO). ISSN 0278-2553. 6 Issues/Year. Impact Factor: 2012(2.359), 2013(1.831), 2014(1.588), 2015(2.287) and 2016(2.236).
- *Worldviews on Evidence- Based Nursing* (*WEBN*). Online ISSN: 1741-6787. 6 Issues/Year. Impact Factor: 2012(1.349), 2013(2.318), 2014(2.381), 2015(1.762) and 2016(2.103).

- *Journal of Advanced Nursing* (*JAN*). Online ISSN: 1365-2648. 12 Issues/Year. Impact Factor: 2012(1.527), 2013(1.685), 2014(1.741), 2015(1.917) and 2016(1.998).

The search strategy included the exact name of each of the six selected journals. The study was limited to articles published only during the period 2012-2017 (inclusive). The records obtained were saved under the name 'savedrecs.txt' in a file that was the source for the data required to construct the bibliometric map, which can be found under 'Save in other file formats' and with the following specifications: in the contents of the record: complete record and references cited for later use in file format: plain text. The search result was greater than 500 records, so the articles were downloaded in batches of 500 and then merged into a single file. The initial search retrieved 3940 articles.

ETHICAL CONSIDERATION

Ethical review was not needed for this study.

Data analysis

Initially, before performing the bibliometric analysis, it was necessary to clean the results obtained. We checked for unknown data and duplicate records and standardized the names of the authors to avoid spelling errors in the names and initials. We solved the issue of synonyms or homonyms in authors' names by using other specific fields, such as "author address" (Jensen, Rouquier, & Croissant, 2008). However, the addresses of all co-authors are not listed in the WoS database, so in cases where the information did not appear, an

additional search was conducted through Google. If the author had changed institutions, then the most current one was chosen.

The bibliometric analysis and construction of the bibliometric map were carried out using the following software: Histcite (version 2010.12.6), Bibexcel (version 2011.02.03) in combination with Pajek (version 3.14) and Vosviewer. The analysis was conducted in two parts: (1) calculation of basic bibliometric indicators; and (2) co-authoring, co-citation and semantic mapping based on the words of the abstract and title.

Validity, reliability and rigour

We checked that the data collected included only sources of information published in the selected journals.

RESULTS

Basic bibliometric indicators

The WoS database search showed 3940 articles in the six journals studied. After revision, those that appeared in duplicate were discarded, with the total number of articles analysed in this study being 3937. The number of articles published per journal varies between 174-1239, with mean 656.17 (SD 468.91); *JAN* (1239) corresponded to almost twice the average, followed by *NET* (1196) and the *IJNS* (699), which had values like the mean. The number of citations ranged from 6140-664, with mean 3319.50 (SD 2341.15). The results indicate higher values for the *JAN* (GCS= 6140), followed by the *IJNS* (GCS = 5371) and *NET* (GCS= 4659), see Table 1.

The articles published in the six journals came from 84 different countries. The number of articles published in the different countries ranges from 1-944, with an average of 58.2 (SD 149.18). The most productive countries were the USA (N=944, 24%) and the UK (N=683, 17.3%), which together produced over 40% of all publications. Slightly less prolific were countries such as Australia (N=504, 12.8%) and Canada (N=245, 6.2%), followed by Taiwan (N=199, 5.1%), Sweden (N=179, 4.5%), China (N=169, 4.3%), the Netherlands (N=157, 4%), South Korea (N=104, 2.6%), Spain (N=104, 2.6%), Norway (N=98, 2.5%), Belgium (N=81, 2.1%) and Finland (N=77, 2.0%).

Our study had the participation of 2980 institutions, including the 10 most prolific institutions, four from Australia, two from the UK and two from the USA. The number of articles published by the different institutions ranges from 1-59, with mean 3.05 (SD 10.79). The most prolific institutions were Griffith University (N=59, 1.5%), King's College London (N=56, 1.4%), the University of Pennsylvania (N=56, 1.4%), the University of Technology Sydney (N=50, 1.3%), Monash University (N=47, 1.2%), the University of Manchester (N=46, 1.2%), the Queensland University of Technology (N=42, 1.1%) and the University California, San Francisco (N=42, 1.1%). Regarding the most cited institutions, the number of citations ranges from 0 to 574, with an average of 17.28 (SD 39.91). The five most cited institutions were the University of Pennsylvania (GCS=574), King’s College London (GCS=484), the University of Manchester (GCS=460), Maastricht University (GCS=450) and finally Karolinska Institutet (GCS=405). In this case, we observe that King's College London and the University of Pennsylvania are both among the most prolific and the most cited universities.

The articles retrieved in our search were produced by 11371 researchers, whose publications ranged from 1-20 articles, with mean 1.44 (SD 1.18), although only 299 authors produced ≥ five articles. It should be noted that 97.4% of the authors appeared in ≤ four articles. The seven most productive authors in descending order as well as the journals where most of their articles were published were as follows: Leino-Kilpi H (N=20, 0.5%) eight articles published in *JAN*, five in *JNS* and six in *NET*; Chaboyer W (N=19, 0.5%) eight articles published in *IJNS* and seven in *JAN*; Salamonson Y (N=19, 0.5%) 12 articles published in *NET* and five in *JAN*; Chan SWC (N=18, 0.5%) 11 articles published in *JAN*; Duffield CM (N=15, 0.4%) 11 articles published in *JAN* and 4 in *IJNS*; Schoonhoven L (N=15, 0.4%) 9 articles published in *IJNS* and 5 in *JAN*; and Van Hecke A (N=15, 0.4%) 10 articles published in *JAN* and 5 in *IJNS*. The most productive authors published more articles in *JAN*, followed by *IJNS* and *NET*. Based on the citations received, the authors received between 0 and 303 citations, with an average of 14.46 (SD 14.05). The eight authors with the highest global citation frequency based on the ISI Web of Science database are as follows: Aiken LH (GCS=303) (7 articles published in *IJNS*); Sermeus W (GCS =296) (11 articles, 6 published in *IJNS* and 5 in *JAN*); Schoonhoven L (GCS=273) (15 articles, 9 published in *IJNS* and 5 in *JAN*); Van den Heede K (GCS=243) (7 articles, 6 published in *IJNS* and 1 *JAN*); Sloane DM (GCS=223) (4 articles published in *IJNS*); Bruyneel L (GCS=217) (7 articles, 5 published in *IJNS*); Van Achterberg T (GCS=205) (11 articles, 5 published in *IJNS* and 3 published in *JNS*); and Laschinger HKS (GCS=201) (11 articles, 7 published in *IJNS* and 3 in *JAN*). According to the data, the frequency of global citation is higher in the *IJNS* journal, followed by *JAN*, with some coincidences between the most productive and the most cited, as shown in Table 2.

In summary, as indicated in Table 2, the most frequently cited authors were Aiken LH and Sermeus W, who accumulated 303 and 296 citations, respectively, for the seven and eleven articles for which they appeared as authors. Schoonhoven L came in third, with 273 citations for his fifteen works. In this regard, five authors with eleven articles, Laschinger HKS (GCS =201), Ritchie JA (GCS=108), Schwendimann R (GCS=162), Van Achterberg T (GCS=205) and You LM (GCS=160), were cited in several articles.

The 10 most frequently cited articles published in the six journals reviewed are presented in Table 3 below. In total, 100 articles stood out for their citation level, which ranged from 25 to 118 citations, with an average of 37.01 (SD 15.67). The most cited article was written by Aiken LH (2013), with 118 citations and was published in the *IJNS*. Next, the second most cited article was written by Schulman-Green D (2012), with 103 citations and was published in the *JNS*. Finally, the third most cited article was written by Kim H (2012), with 88 citations and was published in *JAN*. The most recent article published that was among the 10 most cited articles was written by Melnyk BM (2014), with 69 citations and was published in WEBN.

Co-author, co-citation and thematic analysis

Co-author network

In the network of co-authors for presentation, a threshold of 5 or more collaboratively written citations was set. Using this criterion, 23 authors were identified. The authors were organized into nine groups. The largest group had three members. The largest research groups are shown in Figure 1.

The most collaborative authors were ditto. The two groups to which these authors belonged were the largest and their usual affiliations in the same order of appearance were as follows: University College, Department Health Care, Roeselare, Belgium (Verhaeghe S); University Ghent, University Centre for Nursing and Midwifery, Department of Public Health, Ghent, Belgium (Van Hecke A and Beeckman D); and University of Rome Tor Vergata, Department Biomedicine & Prevention, Nursing Science, Rome, Italy (Alvaro R and Vellone E). Authors belonging to the same research group are identified and more than half of their publications are published in *JAN*.

Co-citation network

In the co-citation network, a threshold of five or more collaboratively written citations was set (Figure 2). Using this criterion, 14 authors were identified from the six journals included in this study. The authors with the highest number of co-citations are Brown CE (*JAN*), Wallen GR (*JAN*) and Melnyk BM (2004, 2008, 2012, 2014) (WEBN). These authors cited each other's work the most and the most frequently researched subjects are job satisfaction, collaborative practices and nurse leaders.

Thematic analysis

In the thematic analysis, 5053 different terms appeared in the titles and abstracts, which we attempted to group by categories. The inclusion criterion was a frequency of occurrence of ≥ 50. Likewise, the exclusion criteria were terms referring to the design or methodology of the research carried out. The terms were filtered to group together those that were synonyms as well as those that appeared in singular and plural or with different genders. In descending order of appearance, the following terms stand out: "nursing"; "student"; "practice";

"patients"; "program"; "simulation"; "intervention"; "quality"; "older"; "woman"; "family"; "cancer"; "adults"; "pain"; "mental"; "stress"; "critical"; "dementia"; "children"; "midwifery", "chronic"; "needs"; and "communication". These terms receive the highest number of citations. As seen in Figure 3, three large groups with different themes from 2012 - 2017 and their associated terms are clearly observed: 'student' identified with green, 'patient' identified with red and 'hospital' identified with blue. It is important to consider in the 'student group' the terms competence, skill, simulation, teaching, clinical practice, nursing practice, teacher, mentor and studying nurse. In the 'patient group', terms such as intervention, life, risk, treatment, disease, pain, child, anxiety, depression, protocol, cancer, etc. become relevant. Finally, in the 'hospital group', important terms such as stress, association, leadership, organization, profession, satisfaction, burnout, environment and commitment were identified.

In addition to the network maps, we generated a density map of title and abstract terms with VOSviewer, as seen in Figure 4. The colour of each point on the map represents the density of the term during the period of study (i.e., red represents higher density while blue represents lower density). The density of the point on the map was calculated using the number of neighbouring terms and the amount of them (using a Gaussian kernel function) (Van Eck & Waltman, 2010). The larger the number of terms to the proximity of a point and the greater the weight of the terms, the closer it is to red. On the other hand, the smaller number of terms to the proximity of a point and the smaller the weight of the terms, the closer they are to blue. In this case, we observe greater density in the term 'patient' and directly related to it appears the term intervention, followed by risk, life, treatment, disease and pain. Next, with lower density, we observe the term 'student' related to the terms competence and skill. Finally, with a lower density, the term 'hospital' appears.

DISCUSSION

In the study, a bibliometric analysis of the six most important nursing journals was carried out according to the impact factor of the Science Citation Index (SCI) through WoS (Web of Science®, Thomson Reuters, New York, USA). The objective was to describe the number of published articles, institutions, countries, authors, citations, most cited articles, co-citations and co-authorships of the journals selected for the period from 2012-2017. A term analysis was also completed. It is relevant to highlight the existence of articles in nursing that address bibliometric analysis to study specific terms (Cheng, Shen, Zhao, Li, & Shang, 2017; Pu, Lyu, & Su, 2016; Yue, Pi, & Fan, 2016), published papers (Peng & Hui, 2011) and nursing research (Ergul, Ardahan, Temel, & Yıldırım, 2010; Pardo, Reolid, Delicado, Mallebrera, & García- Meseguer, 2001). However, we did not find any articles that performed a bibliometric analysis comparing the most important nursing journals according to their impact factor. These studies can lead to advances in research, practice and training in nursing and can increase the quality of nursing care.

According to our results, the descriptive bibliometric analysis showed that *JAN* had a greater number of publications and citations than the other journals analysed. However, the other journals publish fewer issues per year with the exception of *IJNS* which also publishes 12 isssues/year. In general, the most productive countries were the USA (N=944, 24%) and the UK (N=683, 17.3%), which together produced over 40% of all publications. These results are in line with Cecil, Thompson and Parahoo (2006) research. Their found that generalist nursing journals such as the *Journal of Advanced Nursing* and the *International Journal of Nursing Studies* account for a high percentage of nurse researchers, in the UK and US. Moreover, the researchers in the US receive major grants from the National Institutes of Health (NIH), the major federal funding source for health research. The most prolific

institutions were Griffith University (N=59, 1.5%), King's College London (N=56, 1.4%), the University of Pennsylvania (N=56, 1.4%) and the University of Technology Sydney (N=50, 1.3%). King's College London and the University of Pennsylvania are among the most prolific and the most cited universities.

The researchers identified in this study had published between 1 and 20 articles, with an average of 1.44 (SD 1.18), although only 299 produced ≥ 5 articles, while 97.4% of the authors appeared in ≤ 4 articles. The most prolific authors show a tendency to publish in *JAN*, followed by *IJNS* and *NET* in order of priority, in the same way as the study of Cecil et al. (2006). In this group, the following authors who published in *JAN* stand out: Leino-Kilpi H (N=20, 0.5%) with 8 articles in *JAN*; Chan SWC (N=18, 0.5%) with 11 articles in *JAN*; Duffield CM (N=15, 0.4%) with 11 articles in *JAN*; and Van Hecke A (N=15, 0.4%) with 10 articles in *JAN*. In total, only Duffield CM, belongs to one of the most prolific institutions, the University of Technology Sydney. The topics published by these authors are mainly: clinical practice, caregivers and work environment.

Overall, the authors received between 0 and 303 citations with an average of 14.46 (SD 14.05). The most cited authors were Aiken LH and Sermeus W, other than the most prolific, who accumulated 303 and 296 citations, respectively, for the seven and eleven articles for which they appeared as authors. Schoonhoven L came in third, with 273 citations for his fifteen works. Aiken LH, belongs to one of the most prolific institutions, the University of Pennsylvania and Schoonhoven L to one of the most productive countries USA. The topics published by these authors are mainly: clinical practice and work environment. In this case, the citation frequency is higher in *IJNS* followed by *JAN*; one of the reasons could be the

journals's age, the *IJNS* is thirteen years older than *JAN*. The most cited article was written by Aiken LH (2013), with 118 citations, which was published in the *IJNS*. This article is about nurses' assessments of their hospital work environments and quality of care. It´s a cross sectional surveys of 33,659 hospital medical–surgical nurses in 12 European countries (Belgium, England, Finland, Germany, Greece, Ireland, the Netherlands, Norway, Poland, Spain, Sweden and Switzerland (Aiken, Sloane, Bruyneel, Van den Heede, & Sermeus, 2013). Furthermore, the working environments are established as an important subject for research and development again. The success of the citation depends not only on time but also on content, scientific excellence, theoretical rigour, concept, methodological design, funding and authorship (Kulkarni, Busse, & Shams, 2007). The third most cited article was written by Kim H (2012), with 88 citations, which was published in the *JAN*. In addition, depending on the average number of citations per article, *JAN* could be ranked among the highest.

Our study showed that the 10 most cited articles are from the years 2012 and 2013 and are primarily articles describing new knowledge related to "work conditions" and the "workplace in nursing", with the oldest articles receiving proportionally the highest number of citations (Davis, 2014). This could reflect the average from the time an article is published until it reaches a significant number of citations, between four or five years (Kulkarni et al., 2007).

Regarding the authors, the most collaborative were Verhaeghe S, Van Hecke A, Beeckman D, Alvaro R and Vellone E and more than half of their publications are published by *JAN*. The authors, Verhaeghe S, Van Hecke A and Beeckman D are from the same country, one of the most topics they work is pressure ulcer. The authors, Alvaro R and Vellone E, are from

the same institution. They are members of a research program conducted in Italy on "Self-care improves patients' outcomes in heart failure (HF)". The authors with the highest number of co-citations are Brown CE (*JAN*), Wallen GR (*JAN*), Melnyk BM (2004, 2008, 2012, 2014) (WEBN). They belong, to the same country, USA, one of the most productive and the topics most commonly researched were job satisfaction, collaborative practices and nurse leaders.

According to the density maps of the title and abstract terms, we observed greater density in the term 'patient'. Next, with lower density, we observe the term 'student' and finally, with a lower density, the term 'hospital' appears. In line with our results, we found other studies research these terms (Ke, Kuo, & Hung, 2017; Li et al., 2018; Martín- Del- Río, Solanes- Puchol, Martínez- Zaragoza, & Benavides- Gil, 2018). It´s important for nursing research, professionals, managers and nursing professors in everywhere, to know which are the journals with most published articles or articles cited, the most relevant institutions, countries, authors, most cited articles, as well as getting to know the most relevant academic teams (Mantzoukas, 2009). All this will serve to include current and quality knowledge in their daily work, whether in professional practice, in academic research or in the training of future nurses. It seems important patient-focused research, to further build a base for making evidence-based clinical decisions and students because they will be the future professionals. In our contemporary world, studies seem to be focused on hospitals, specifically on nurses and the nursing profession, are required for avoid: nursing shortages, problems of recruitment and retention threaten (O'Brien-Pallas, Duffield, & Alksnis, 2004a; O'Brien-Pallas et al., 2004b; O'Brien- Pallas, & Hayes, 2008). We need to understand nurses' work environments and factors that promote effective nursing practice (Polit & Beck, 2009). This could explain, in our study, the growing interest of the authors in studying nursing work environments, in

the same way as the projects established by the most relevant international institutions in the field of health such as the World Health Organization (WHO) or the International Council of Nurses, one of the priority lines of study should be the work environments. However, it is difficult to determine to what extent these priority lines are being addressed by scientific research, one way of doing this is through projects granted with public and private funds. Although, these measures are at least difficult to standardise to draw conclusions and leave out other types of political or management actions. Therefore, bibliometric studies become the most effective tool to evaluate of these priority lines among researchers.

Finally, when considering the evolution of the number of publications, there was an increasing trend during the study period 2012 - 2017, reaching maximum values in 2013 (751) and 2016 (796). On the other hand, the number of global citations tends to decrease over the years, reaching maximum values in 2012 (6801) and progressively decreasing until 2017 (105). In the same way, the researchers found that some of the articles that the experts assessed as having important results were not highly cited in the first three years after their publication (Oermann, Shaw- Kokot, Knafl, & Dowell, 2010).

Strengths and limitations

The main strength of this study is the application of bibliometric analysis to determine the state of nursing research as well as its evolution to contribute to the development of research, practices and education in nursing. However, there are limitations to this work because we used only one indicator, the articles published in one database, without accounting for other indicators from other indices of impact of databases such as SCOPUS, nor other indicators of academic quality: transfer through congresses, patents, etc. Future research should compare

the results obtained with other types of indexations or journals to complete the information provided. Likewise, it has not been analyzed in detail whether each of the articles or citations included has been previously retracted or whether any of the authors have papers previously retracted, a negative academic aspect not reflected in the study. Future research should explore this aspect further.

CONCLUSION

Bibliometric analysis of the six journals included in this study showed that 3937 articles were written by 11,371 authors from 2980 institutions and 84 countries from 2012 to 2017.

The results of the present research allowed us to better understand the current state of nursing research and its evolution. This information is important for the future development of nursing research, both for readers and professionals, by suggesting gaps in the literature that could in turn guide both current trends and future directions of research, by allowing, among other things, to compare the most frequent topics in nursing research with the priority lines defended by experts and institutions.

In this sense, the "work environment" is a very important topic for the authors and priority areas for health agencies such as the World Health Organization (WHO) and for an international organization of health professionals, International Council of Nurses. These lines have been addressed in the studies with the aim of improving working environments and avoiding problems such as: nursing shortages, problems of recruitment and retention threaten (O'Brien-Pallas, Duffield, & Alksnis, 2004a; O'Brien-Pallas et al., 2004b; O'Brien- Pallas, & Hayes, 2008).

In the future it will be necessary to establish areas of research or improvement, intervention plans and training programmes orienting research towards the demands of professionals and society to satisfy professionals´ needs and provide high quality nursing care. It would also be interesting to compare our results with the opinions of experts in the field.

AUTHOR CONTRIBUTIONS

All authors have agreed on the final version and meet at least one of the following criteria [recommended by the ICMJE (http://www.icmje.org/recommendations/)]:

• substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;

• drafting the article or revising it critically for important intellectual content.

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Table 1. Journals, number of articles and GCS (2012-2017)

JOURNAL	ARTICLES	%	GCS
JOURNAL OF ADVANCED NURSING	1239	31.5	6140
NURSE EDUCATION TODAY	1196	30.4	4659
INTERNATIONAL JOURNAL OF NURSING STUDIES	699	17.8	5371
JOURNAL OF NURSING SCHOLARSHIP	330	8.4	1732
NURSING OUTLOOK	299	7.6	1351
WORLDVIEWS ON EVIDENCE-BASED NURSING	174	4.4	664

Note: GCS = Global Citation Score of the ISI´s database Web of Science

Table 2. Most productive authors (≥ 10 papers) and most cited authors

Author	N	%	GCS
Leino-Kilpi H	20	0.5	96
Chaboyer W	19	0.5	56
Salamonson Y	19	0.5	98
Chan SWC	18	0.5	142
Duffield CM	15	0.4	88
Schoonhoven L	15	0.4	273
Van Hecke A	15	0.4	65
Alvaro R	13	0.3	38
Halfens RJG	13	0.3	139
Verhaeghe S	13	0.3	70
Williams B	13	0.3	46
Beeckman D	12	0.3	50
Bucknall TK	12	0.3	37
Kim S	12	0.3	119
Kottner J	12	0.3	92
Lavoie-Tremblay M	12	0.3	74
Shyu YIL	12	0.3	66
Vellone E	12	0.3	35
Drach-Zahavy A	11	0.3	51
He HG	11	0.3	49
Laschinger HKS	11	0.3	201
Ritchie JA	11	0.3	108
Schwendimann R	11	0.3	162
Sermeus W	11	0.3	296
Van Achterberg T	11	0.3	205
Wang WR	11	0.3	39
You LM	11	0.3	160
Zabalegui A	11	0.3	87
De Geest S	10	0.3	96
Francke AL	10	0.3	87
Gardner GE	10	0.3	85
Grady PA	10	0.3	55
Gustavsson P	10	0.3	130
Heitkemper MM	10	0.3	56

Jackson D	10	0.3	49
Palese A	10	0.3	41
Riegel B	10	0.3	61
Salminen L	10	0.3	50
Suhonen R	10	0.3	78
Tsai YF	10	0.3	25
Verbeek H	10	0.3	58
Wallin L	10	0,3	83
Aiken LH	7	0.2	303
Van den Heede K	7	0.2	243
Sloane DM	4	0.1	223
Bruyneel L	7	0.2	217
Matthews A	5	0.1	166
Redeker NS	7	0.2	148
Schols JMGA	7	0.2	147
Van Bogaert P	5	0.1	138
Schubert M	6	0.2	123
Liu K	4	0.1	119
Rudman A	9	0.2	119
Grey M	4	0.1	118
Reynolds NR	2	0.1	118
Schulman-Green D	2	0.1	118
Meyer G	9	0.2	114
Whittemore R	4	0.1	112
Ensio A	2	0.1	108
Brunetto Y	8	0.2	105
Shacklock K	8	0.2	105
Alonzo A	1	0.0	103
Jaser S	1	0.0	103
Martin F	1	0.0	103
McCorkle R	1	0.0	103
Grau AL	2	0.1	99
Lesaffre E	6	0.2	99
Wong CA	4	0.1	99
Heinen MM	2	0.1	97
Zander B	3	0.1	97

Note: GCS = Global Citation Score of the ISI´s database Web of Science.

Table 3. The 10 most cited articles published

Articles	GCS
664 Aiken LH, Sloane DM, Bruyneel L, Van den Heede K, Sermeus W. Nurses' reports of working conditions and hospital quality of care in 12 countries in Europe**.** INTERNATIONAL JOURNAL OF NURSING STUDIES. 2013 FEB; 50 (2): 143-153	118
302 Schulman-Green D, Jaser S, Martin F, Alonzo A, Grey M, et al. Processes of Self-Management in Chronic Illness**.** JOURNAL OF NURSING SCHOLARSHIP. 2012 JUN; 44 (2): 136-144	103
174 Kim H, Chang MD, Rose KM, Kim S**.** Predictors of caregiver burden in caregivers of individuals with dementia. JOURNAL OF ADVANCED NURSING. 2012 APR; 68 (4): 846-855	88
1422 Melnyk BM, Gallagher-Ford L, Long LE, Fineout-Overholt E. The Establishment of Evidence-Based Practice Competencies for Practicing Registered Nurses and Advanced Practice Nurses in Real-World Clinical Settings: Proficiencies to Improve Healthcare Quality, Reliability, Patient Outcomes, and Costs**.** WORLDVIEWS ON EVIDENCE-BASED NURSING. 2014 FEB; 11 (1): 5-15	69
667 Heinen MM, van Achterberg T, Schwendimann R, Zander B, Matthews A, et al. Nurses' intention to leave their profession: A cross sectional observational study in 10 European countries. INTERNATIONAL JOURNAL OF NURSING STUDIES. 2013 FEB; 50 (2): 174-184	68
121 de Casterle BD, Gastmans C, Bryon E, Denier Y. QUAGOL: A guide for qualitative data analysis**.** INTERNATIONAL JOURNAL OF NURSING STUDIES. 2012 MAR; 49 (3): 360-371	63
1199 Ward DJ, Furber C, Tierney S, Swallow V. Using Framework Analysis in nursing research: a worked example. JOURNAL OF ADVANCED NURSING. 2013 NOV; 69 (11): 2423-2431	60
115 Mealer M, Jones J, Newman J, McFann KK, Rothbaum B, et al. The presence of resilience is associated with a healthier psychological profile in intensive care unit (ICU) nurses: Results of a national survey. INTERNATIONAL JOURNAL OF NURSING STUDIES. 2012 MAR; 49 (3): 292-299	59
135 Lowe G, Plummer V, O'Brien AP, Boyd LTime to clarify - the value of advanced practice nursing roles in health care. JOURNAL OF ADVANCED NURSING. 2012 MAR; 68 (3): 677-685	57
114 Laschinger HKS, Grau AL. The influence of personal dispositional factors and organizational resources on workplace violence, burnout, and health outcomes in new graduate nurses: A cross-sectional study. INTERNATIONAL JOURNAL OF NURSING STUDIES. 2012 MAR; 49 (3): 282-291	55

Note: GCS = Global Citation Score of the ISI´s database Web of Science

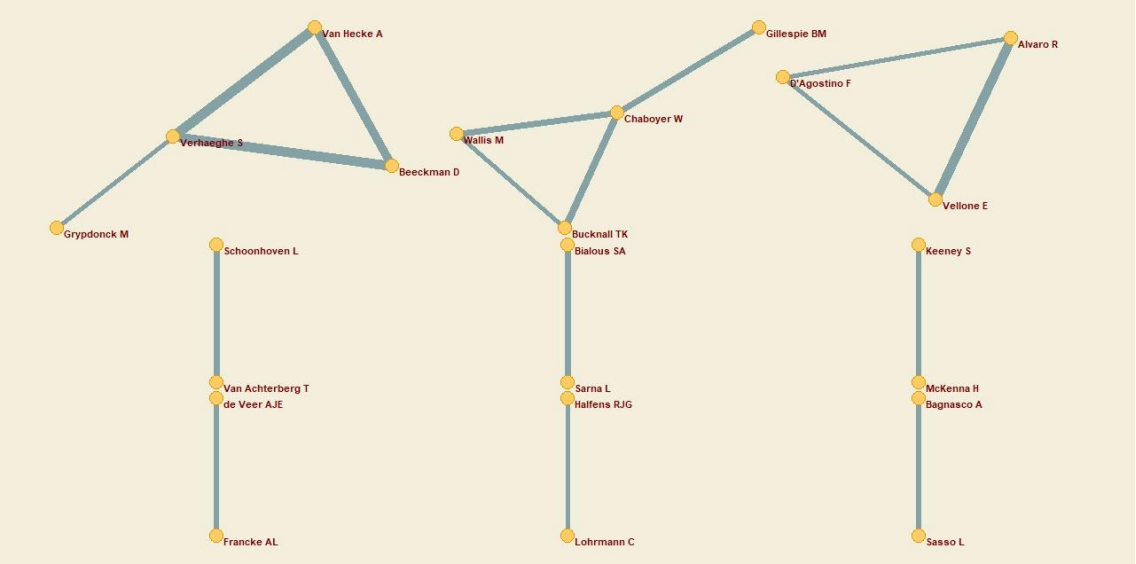

Figure 1. ≥5 co-authored publications

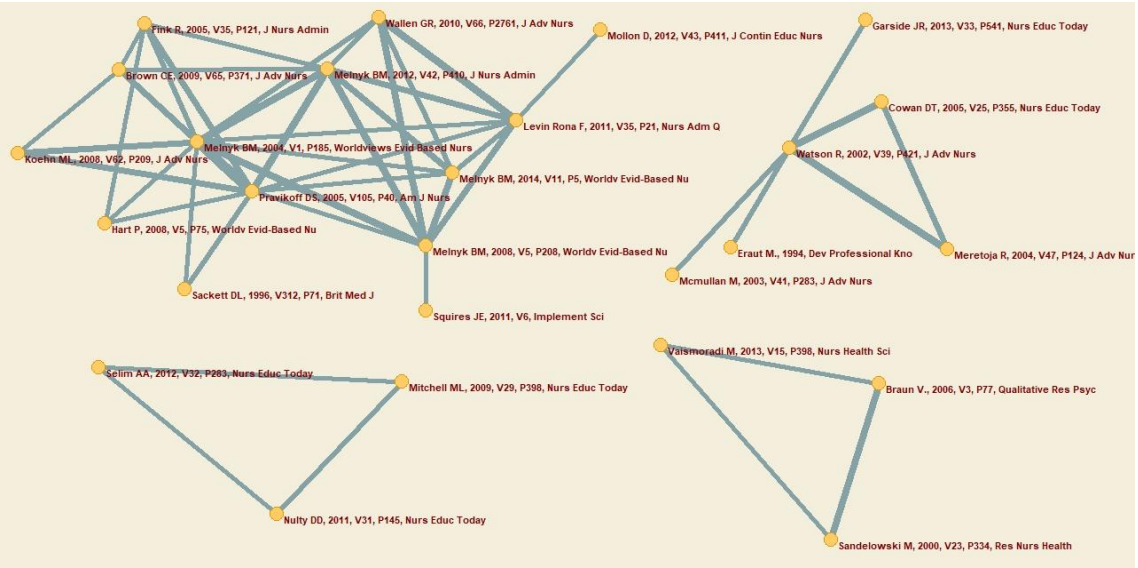

Figure 2. ≥5 co-citations publications

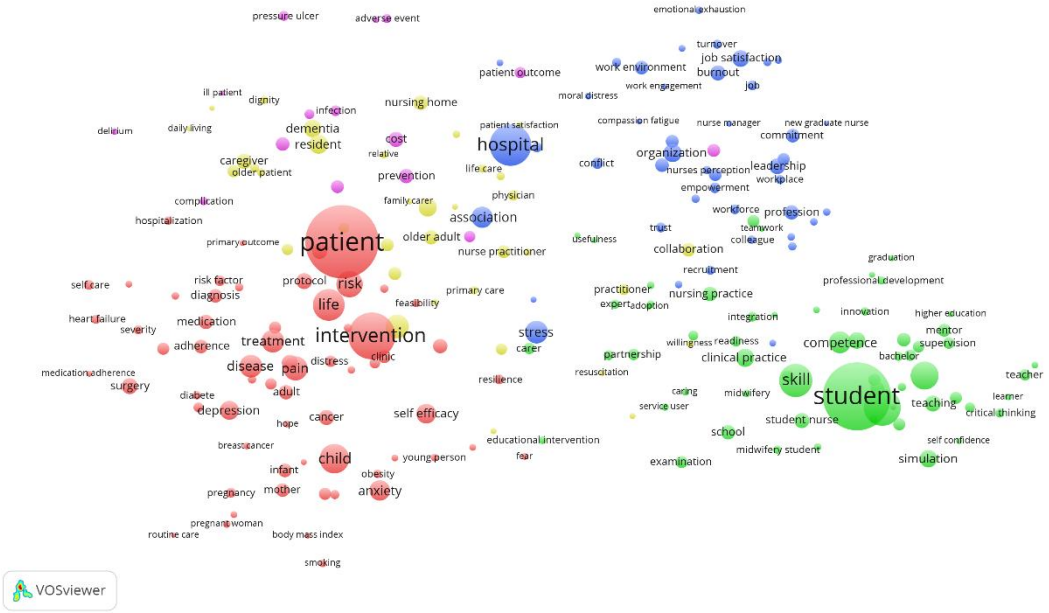

Figure 3. Abstract and title terms from 2012 to 2017

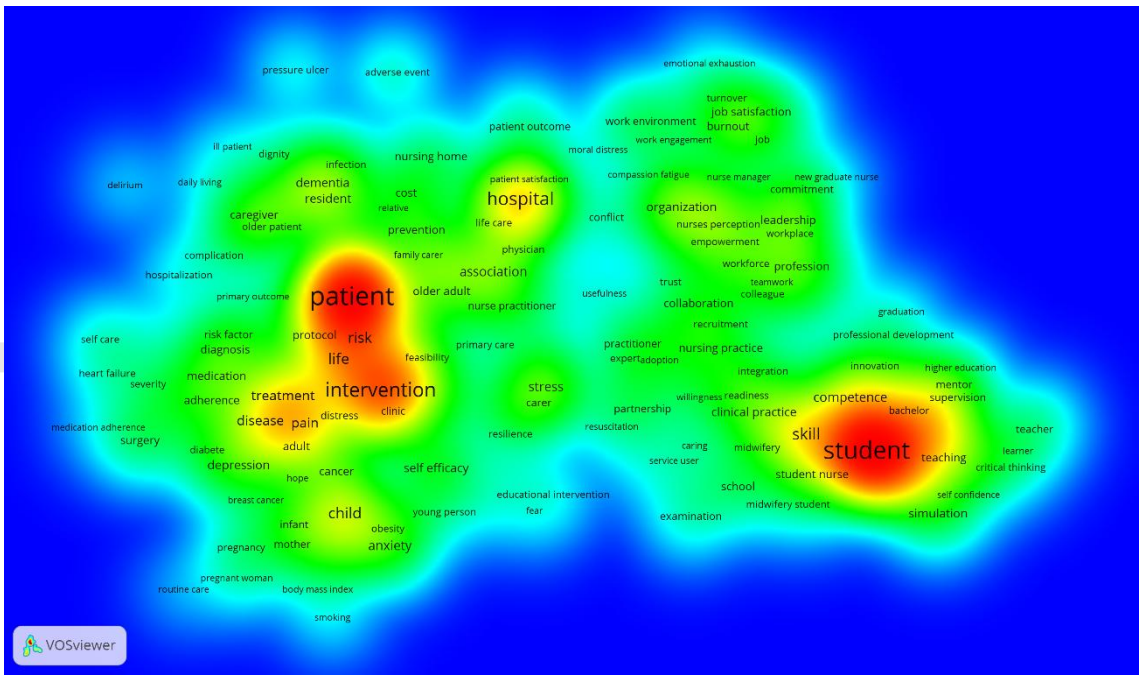

Figure 4**.** Density citation map of the words published in journals from 2012-2017