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Review

Bibliometric analysis on infusion therapy and intensive care

Análise bibliométrica sobre terapia infusional e cuidados intensivos

Análisis bibliométrico sobre terapia de infusión y cuidados intensivos

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RESUMO

Objetivo: mapear o comportamento da produção científica sobre terapia infusional em terapia intensiva na Scopus. **Método:** estudo tipo bibliométrico, com análise estatística descritiva de artigos indexados na Scopus de 2010 a 2021. **Resultados:** foram recuperados 857 documentos, publicados em 393 periódicos, 738 artigos originais e 119 de revisão. Contabilizou-se 32 artigos de autoria única e 5814 com autoria múltipla. A média de artigos por autor foi de 0,147 e o índice de colaboração de 7,06. **Conclusão:** muito embora baseada em fatos empíricos, as leis de Bradford e Lotka confirmaram possíveis hipóteses teóricas de que o núcleo de periódicos é formado pelos mais devotados e, portanto, mais produtivos, não obstante, revelou que quanto mais específico for o assunto/tema, mais limitada será a possibilidade de identificação de grupos de Elite de autores.

DESCRITORES: Terapia infusional; Cuidados intensivos; Bibliometria.

ABSTRACT

Objective: to map the behavior of scientific production on infusion therapy in intensive care in Scopus. **Method:** bibliometric study, with descriptive statistical analysis of articles indexed in Scopus from 2010 to 2021. **Results:** 857 documents were retrieved, published in 393 journals, 738 original articles and 119 review articles. There were 32 articles of single authorship and 5814 with multiple authorship. The average number of articles per author was 0.147 and the collaboration index was 7.06. **Conclusion:** although based on empirical facts, the laws of Bradford and Lotka confirmed possible theoretical hypotheses that the nucleus of journals is formed by the most devoted and, therefore, the most productive, nevertheless, it revealed that the more specific the subject/theme, the more limited the possibility of identifying elite groups of authors will be.

DESCRIPTORS: Infusion therapy; Intensive care; Bibliometrics.

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RESUMEN

Objetivo: mapear el comportamiento de la producción científica sobre terapia de infusión en cuidados intensivos en Scopus. **Método:** estudio bibliométrico, con análisis estadístico descriptivo de artículos indexados en Scopus de 2010 a 2021. **Resultados:** se recuperaron 857 documentos, publicados en 393 revistas, 738 artículos originales y 119 artículos de revisión. Hubo 32 artículos de autoría única y 5814 con autoría múltiple. El número medio de artículos por autor fue de 0,147 y el índice de colaboración fue de 7,06. **Conclusión:** aunque basadas en hechos empíricos, las leyes de Bradford y Lotka confirmaron posibles hipótesis teóricas de que el núcleo de las revistas está formado por las más dedicadas y, por lo tanto, las más productivas, sin embargo, reveló que cuanto más específico es el tema, más limitada será la posibilidad de identificar grupos de élite de autores.

DESCRIPTORES: Terapia de infusión; Cuidados intensivos; Bibliometria.

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INTRODUCTION

Unlike what common sense may think, infusion therapy is not a recent technology, its beginning dates back to the fifteenth century, however, the changes occurred very rapidly from the devices used for this therapy, which went from animal bladders used as bags containing the solution to be infused, to highly technified vascular access wrappings and devices.[1]

The French physician Jean Baptiste Denis is credited with performing the first blood transfusion involving an animal and a human being in 1667.2 The same feat was accomplished in 1832 by the physician Thomas Latta, when, during a cholera epidemic in Great Britain, he infused contaminated saline solutions in patients suffering from diarrhea, and some patients improved significantly their dehydration. This event ended up corroborating the theory described by physician William Brooke O'Shaughnessy's, about cholera patients losing large amounts of water and saline solution in the blood, therefore, a great discovery for medicine and for the science practiced at that time, mainly communicated through letters and scientific meetings "congresses".[2]

The great leap forward in infusion therapy occurred in 1870, when the physician Pierre Cypren Ore, started to use a needle and syringe to administer intravenous medications and solutions, a technique developed by Dr. Alexander Wood, described in 1853.[2]

Until then performed by physicians, the venipuncture procedure with intravenous devices began to be performed by nurses at Massachusetts General Hospital in 1940. These professionals were known as IV Nurses, since they were responsible for providing care to patients under venous infusion.[2]

With technological evolution, many intravenous devices have been developed, from the peripheral to the central access devices, including implantable ones, as is the case of the long term central venous access device (CVAD, Port-type or Broviac-Hickman), widely used in oncology for the administration of antineoplastic agents.[3-4] However, the most widely used device in infusion therapy has still been the PICC - Peripherally Inserted Central Catheter, described in 1929 for the treatment of heart diseases, but it was in 1970 that the Center for Disease Control and Prevention (CDC) began to make important recommendations on the need to control infections related to infusion therapy.[4]

The Brazilian Society of Intensive Care Nurses (SOBETI), created in 1986, was the first institution to certify and qualify Brazilian nurses, regarding the insertion procedure of peripheral central catheters.[5]

With the advent of hard technologies, especially in intensive care units, the indications for infusion therapy had a substantial increase, which has led many nursing researchers to scientific propositions to evaluate its efficacy. It is undeniable that infusion therapy and its techniques are an important resource for the administration of drugs, blood and blood products, and even nutritional support.

As the procedure brings with it risks, both for the patient and the health professional, a prepared and technically qualified team is

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required. The insertion of the PICC is done with the use of the ultrasound, so the nurse must know how to operate it, guiding the catheter through the patient's vein with the help of the equipment's image." According to her, the PICC can reduce the risk of bloodstream infection, which has a cost, which at first seems high: 19.5 days of hospitalization or US$ 96 thousand (about R$ 212 thousand) to the patient and/or the Unified Health System (SUS).[6]

Given this scenario, it is reasonable to infer that the scientific research that gave rise to infusion therapy followed its development, whether in the quantity of scientific communication, but also in the quality of its vehicles, especially scientific journals.

Mainly, infusion therapy is quite common in intensive care units, where health professionals assist their patients, providing diversified and highly technical care, perform many procedures according to clinical condition and individual needs, with some frequency, mostly invasive procedures like this, with possible deleterious effects that lead to morbidity and mortality, such as those resulting from venous catheterization, but that can be minimized with the use of appropriate and proven effective technologies.6 Therefore, the state of the art of these evidences through scientific research may find in bibliometric studies, important indicators capable of pointing to elite groups of researchers on the subject, more devoted journals, more appropriate descriptors, etc.[7-8]

Bibliometric research, with a statistical basis, has three classic Laws, recognized worldwide: Bradford's Law (law of dispersion of scientific knowledge), Lotka's Law (law of productivity of authors) and Zipf's Law (frequency of words). Bibliometric analysis confers greater objectivity when compared to the bibliographic studies used to evaluate scientific production. However, bibliometrics is not concerned only with the quantitative aspect. It is also concerned with verifying the relevance and the impact of authors, journals, institutions, groups or countries in the most diverse areas of knowledge.[7-11]

Its main objective is to study the quantitative aspects of knowledge production, providing researchers with an assessment of the current state of the sciences, as well as research management.[9-10]

The justification for this research lies in the possibility of better characterizing and mapping the profile of scientific production on infusion therapy in intensive care, perhaps it can contribute to researchers in the health area, especially nursing, identifying and quantifying the temporal distribution of the production of articles on this theme, geographic location, the impact of communication vehicles, authors' elite, among other bibliometric indicators of interest.

Before the advent of the Internet, mapping scientific production in information vehicles - journals, was undoubtedly a challenge for researchers. However, with the advance of information science, it seems that the challenge still remains, however, unlike the past centuries, the quantity and quality of scientific information obeys the new paradigm of science, the Systemic Thinking.[12] Therefore, this study investigated the

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following question: what is the state of the art on infusion therapy and intensive care? The objective of this study is to analyze scientific research in the area of infusion therapy and intensive care, by means of a bibliometric study.

MÉTHODOLOGY

Bibliometric study, with descriptive statistical analysis, which analyzed the scientific production in the modality of original and review articles, registered in the Scopus database, between 2010 and 2021. The principle of bibliometry comprises the use of reliable indicators, which can be defined as parameters used in evaluation processes.[9-11]

Information retrieval was performed in the Scopus database in the month of November 2022, using the descriptors contained in the string (ABS (infusion AND therapy) AND KEY (intensive AND care)) AND (EXCLUDE (SUBJAREA , "ENGI") OR EXCLUDE (SUBJAREA , "IMMU") OR EXCLUDE (SUBJAREA , "PHAR") OR EXCLUDE (SUBJAREA , "BIOC") OR EXCLUDE (SUBJAREA , "NEUR") OR EXCLUDE (SUBJAREA , "HEAL") OR EXCLUDE (SUBJAREA , "CENG") OR EXCLUDE (SUBJAREA , "MATE") OR EXCLUDE (SUBJAREA , "MULT") OR EXCLUDE (SUBJAREA , "AGRI") OR EXCLUDE (SUBJAREA , "COMP") OR EXCLUDE (SUBJAREA , "VETE") OR EXCLUDE (SUBJAREA , "ENVI") OR EXCLUDE (SUBJAREA , "PSYC") OR EXCLUDE (SUBJAREA , "SOCI") OR EXCLUDE (SUBJAREA , "CHEM") OR EXCLUDE (SUBJAREA , "MATH") OR EXCLUDE (SUBJAREA , "PHYS") OR EXCLUDE (SUBJAREA , "DENT")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")).

Scopus was chosen because it is the largest database of abstracts and citations of peer-reviewed literature, with bibliometric tools to track, analyze and visualize research. In addition, it contains more than 55 million records dating back to 1823, of which 84% have references dating back to 1996. The data were statistically treated using Excel® and Bibliometrix® 3.1 applications.

In the present study, the following bibliometric indicators were applied: Price's index[12], annual growth rate, Price's transience index[12], Lotka's Law[10-11], h-factor and Bradford zones[10-11]. Of the available bibliometric indicators of production, Price's law[12] was applied. This law is the most widely used indicator to analyze the productivity of a specific discipline or of a particular country and is used to illustrate the fundamental aspect of scientific production, which is its exponential growth.

RESULTS

Using the above search criteria, we retrieved 857 documents, distributed over 393 journals. The annual growth rate was 6.17%. The average number of years from publication was 5.84 years. The average citation per article was 29.81, while the average article citation per year was 4.172. The number of original articles was 738(86.1%) and review articles were 119(13.9%). There were 5,846 authors. There were 32(0.54%) articles with single authorship and 5,814(99.6%) with multiple authorship.

The average number of authors per paper was 6.82, while the average paper per author was 0.147. The most productive author published 16(2.14%) documents. The

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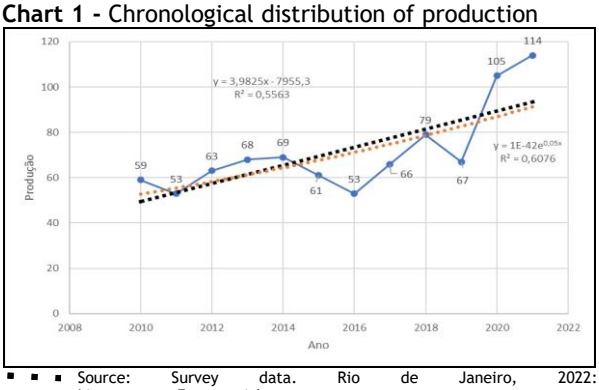
collaboration index was 7.06 while the co-authorship per document reached 7.76.

To evaluate whether the growth of scientific production follows Price's exponential growth law12, we performed a linear fit with the acquired data, according to the equation y = 3.982x - 7955.3, followed by a fit to an exponential curve, according to the equation y = 1E-42e^{0,05x}.

Chart 1 - Chronological distribution of production

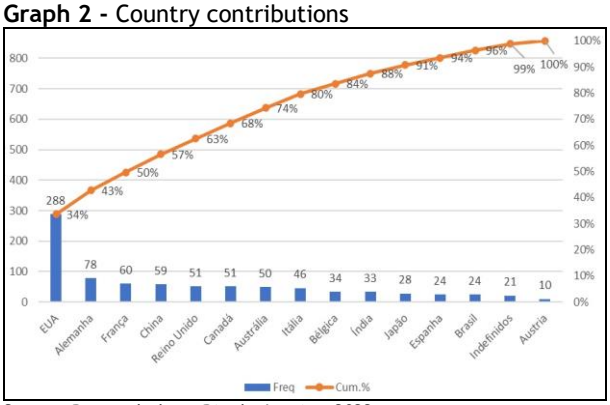


Source: Survey data. Rio de Janeiro, 2022: Linear curve; Exponential curve.

Graph 1 shows the chronological distribution of production. As this reflects, the mathematical adjustment for a linear curve reveals a correlation coefficient (R2) of 0.5563, indicating that 44.37%, can be explained by this adjustment. On the other hand, the exponential fit of the measured values provides an R2 of 0.6076, and therefore a percentage of residual variability of 39.24 %. According to these results, we can conclude that the analyzed repertoire conforms to a linear rather than exponential fit, and that the postulates of Price's Law[12] are not fulfilled. However, it is important to note the low degree of variability that exists, as the correlation coefficient is closer to 1 than to 0.

The geographical and affiliation distribution of the documents is presented in Chart 2. It is worth noting that only three countries, the United States, Germany, and France, produced 50% of the articles, far ahead of the remaining 12 countries. The geographical distribution of the retrieved publications shows the absolute leadership of the United States with 288 documents (34%).

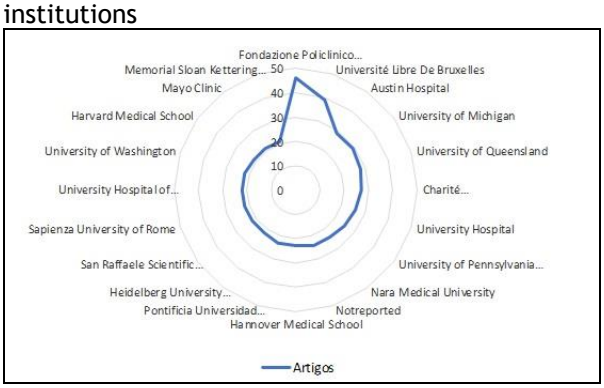
Graph 2 - Country contributions



Source: Research data. Rio de Janeiro, 2022.

Chart 3 shows the 20 most productive institutions in relation to the material under study. We found that these institutions contributed 60.2% of the production. Notable were the Fondazione Policlinico Universitario A. Gemelli IRCCS and the Université Libre de Bruxelles, which together contributed 85 article production, representing 9.9% of the total articles produced.

Graph 3 - Contribution of the 20 most productive institutions



Source: Research data. Rio de Janeiro, 2022.

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After applying Lotka's law, the distribution of authors was heavily concentrated on small producers, with a high transience rate of 91% (occasional authors).

Table 1 - Dispersion of authors according to the level of productivity

	PI= 1 (10 or more)	0 < PI <1 (2 to 9 articles)	PI = 0 (1 article)	Total
Number of authors	3	523	5320	5846
% Authors	0,1%	8,9%	91,0%	100%

Source: Survey data. Rio de Janeiro, 2022.
PI = Productivity Index.

The total number of authors for 857 papers was 5846, representing a coauthorship rate of 6.8. The most common number of signatures per paper is 1, indicating highly individualized research.

Among the 20 most productive authors, there was great variability in the h-index, ranging from 4 to 14, respectively, Dr. Darmon M from Université Paris - France (6 articles) and Roberts JA from University of Queensland - Australia (15 articles).

In the scientific journals where the articles on infusion therapy and intensive care were published, we applied the Bradford model. The mean number of articles per Bradford area was 93. Table 2 shows the division into Bradford areas of the material under study.

The core is a single American journal, Optometry and Vision Science, with over 45% of the records (127 papers) with an impact factor of 1,442, data from this core as of 2016.Table 1 presents in summary form, the Bradford Table, with distribution of the core journals, i.e., those contained in Bradford zone 1.

Table 2 - Bradford table

Zones	Number of Articles	% Articles	Number Periodicals	% Periodicals	mB	XmB
Infusion Therapy and Intensive Care Center	283	33,02%	22	5,60%	4,54545	5,90045
1	292	34,07%	100	25,45%	5	
2	282	32,91%	271	68,96%	2,71	

Source: Survey data. Rio de Janeiro, 2022.
mB = Bradford Multiplier
XmB = Average of the Bradford Multiplier

DISCUSSION

The analyses showed that the corpus of data mined in Scopus is consistent, because the search strategy allowed the retrieval of documents based on the descriptor contained in the string used, delimiting the theme/research question.

Bibliometric studies have interesting tools to evaluate the social and scientific importance of a given discipline in a specific period. The term "bibliometrics" was introduced in 1969 by Alan Pritchard[12] to define the application of mathematical and statistical methods to the process of written communication in the area of scientific disciplines, through the quantitative analysis of the different aspects of this type of communication.

Provided that an adequate number of appropriate standardized indicators are used, this type of study can be very useful to describe and assess the state of the art on the subject of infusion therapy and intensive care, and can provide information on the trend of this subject over time. However, it should also be noted that this type of study has some limitations, such as the fact that bibliometric studies do not take into consideration the quality of the publications

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or the lack of consistency in the use of authors' names.

The design of our analysis shows a general evaluation of the growth of the scientific literature on the subject studied. In this sense, it is to make a general assessment of the growth of the scientific literature. Graph 1 shows that the number of scientific publications has undergone exponential growth in the last 12 years, until the end of the period studied, without any evidence of approaching saturation as postulated by Price[12] in his theory on the expansion of scientific literature. The fact that the annual growth of the scientific literature is 6.17% should be considered positive, demonstrating the great thematic dynamism in the two thematic areas studied, medicine and nursing.

Bibliometric analysis can also compare the contributions of institutions, journals, authors, and countries. We evaluated the contributions from different countries. The country that published the most was the United States, as well as other publications related to the topic.[13-14] After the United States, the countries with the most publications are Germany, France, China, and the United Kingdom and Canada. The top three English-speaking countries, the United States, the United Kingdom, and Canada, are among the top six producing countries, and between them they generate more than half of the production (63%) in this field. The fact that the technologies for infusion therapy have their origins in the U.S. and U.K., in addition to the financial resources for the acquisition of these technologies when compared to other countries, may explain this situation.

Although there are many authors (n = 5846), only 3 are "the most productive" (Table 1). It is also important to note that universities are the most productive institutions, as shown in Graph 3.

Previous bibliometric studies have shown to have many limitations when adopting the sociometric approach.[11-14] Obviously, international scientific production in a particular field such as the study is much more extensive (e.g., papers presented at scientific conferences, or certain journals, none of which are indexed in the usual databases). We could also cite the lack of standardization of authors' names, as well as other limitations arising from the incorrect use of methodological filtering.[13-15] However, the recognized quality and comprehensiveness of the publications included in the databases used in this study makes the articles chosen a more than representative sample of international research in the field in question.

There was little dispersion in the productivity of the journals, unlike the bibliometric study conducted in 2019 on peripheral venous catheterization[11], which showed low productivity and much dispersion.

The same occurred with the collaboration index, 5.45 in the 2019 study[11] and 7.06 in this study, both within the average admitted in most national and international journals, of a maximum of six authors per article.

It is quite reasonable to infer that the high coauthorship rate is most likely due to the

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high relevance or interest of the subject by the researchers, which impacts scientific publications. This finding is reinforced when the √n (square root) of the number of authors (n) was calculated, as recommended by Lotka and Price's Law to identify the Elite group in the production of articles on a given theme/subject.

The value found was approximately 76 authors. For there to be an established Elite group, Price's Law of Elitism[13-15] determines that members belonging to this group need to produce at least 60% of the publications. In this study, the 76 most productive authors participated in the publication of 354 (41.3%) of the total articles published, thus, the average publication was 0.147 documents per author, not being in line, therefore, with Price's Law for finding an elite group on the subject, which was already demonstrated in the high percentage of authors in only a single article, reaching 91%.

The metric of co-authorship is an important indicator that allows the identification of the level of scientific collaboration, one of the most researched variables in Social Network Analysis (SNA), since it may provide the researcher with a broad view of the invisible colleges in which the vertices of the research are immersed, in addition to a series of other findings regarding the bonding relationships in the scientific field.[10-13]

Bradford's Law was applied in this study to verify the behavior of the distribution/dispersion of the journals, whose statement is: by building a table in descending order of the production of the journals on a given theme, it will be possible to distinguish a core of journals more devoted to the studied theme and several groups/zones with the same number of articles as the core, but with a greater number of journals in the proportion of: Zone 1 = Y, Zone 2 = 3Y and Zone 3 = 3Y2.[12-13]

From Table 2, it was possible to identify that the journals present in the core, do not correspond to the group of journals most devoted to the subject, since there was an increased variation in mB between zones 2 and 3, respectively, 4.545455 and 2.71.[8-10] The most productive journal - Critical Care Medicine - ISSN: 0090-3493, is classified in the Qualis 2013-2016, in the areas of Medicine I, II and III, as well as Nursing, in the A1 extract. Therefore, an important journal edited by Wolters Kluwer Health of New York, with CiteScore 2021 of 15.0, SJR 2.689 and SNIP 2.530.

CONCLUSION

The study dealt with the analysis of 857 documents retrieved from the Scopus database, published in 393 journals in the period 2010-2021, mostly international, which may indicate low productivity of Brazilian researchers on the subject. It was possible to demonstrate the evolution of the number of publications over 12 years, the origin of the retrieved documents and their journals, the impact factor, and geographic location. This study shows the general trend in infusion therapy research, with the United States occupying the leading position in this field.

Despite the significant number of authors, it was still not possible to determine an elite group on the topic. Finally, it can be stated that, despite the limitations of bibliometric

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studies, this study provides a comprehensive picture of published scientific research on infusion therapy intensive care. Research in this field will probably grow even more in the coming years.

Although based on empirical facts, the laws of Bradford and Lotka confirmed possible theoretical hypotheses that the core of journals is formed by the most devoted and therefore most productive, nevertheless it revealed that the more specific the subject/theme, the more limited the possibility of identifying elite groups of authors.

REFERÊNCES

1. Paterson RS, Chopra V, Brown, Kleidon TM, Cooke M, Rickard CM, et al. Selection and Insertion of Vascular Access Devices in Pediatrics: A Systematic Review. Pediatrics. [Internet]. 2020 [cited 2022 nov 18]; 145(Supplement_3):S243–S268. Available from: https://doi.org/10.1542/peds.2019-3474H.

2. Pedreira MLG, Chaud MN. Terapia intravenosa em pediatria: subsídios para a prática da enfermagem. Acta Paul. Enferm. (Online). [Internet]. 2004 [cited 2022 nov 18];17(2). Available from: https://acta-ape.org/article/terapia-intravenosa-em-pediatria-subsidios-para-a-pratica-da-enfermagem/.

3. Morrison VA, Peterson BA, Bloomfield CD: Nosocomial septicemia in the cancer patient: the influence of central venous access devices, neutropenia, and type of malignancy. Med Pediatr Oncol. [Internet]. 1990 [cited 2022 nov 18];18(3). Available from: https://doi-org.ez39.periodicos.capes.gov.br/10.1002/mpo.2950180309.

4. Rackoff WR, Ge J, Sather HN, Cooper HA, Hutchinson RJ, Lange BJ: Central venous catheter use and the risk of infection in children with acute lymphoblastic leukemia: a report from the Children's Cancer Group. J Pediatr Hematol Oncol. [Internet]. 1999 [cited 2022 nov 18];21(4). Available from: https://doi-org.10.1097/00043426-199907000-00005.

5. Freitas LCM. Curso de qualificação em inserção, utilização e cuidados com cateter Venoso Central de Inserção Periférica-Neonatologia e pediatria [CD-ROM]. São Paulo: SOBETI; 2004.

6. Silva ACSS, Santos EI, Queiroz PT, Góes FGB. O papel do enfermeiro com o cateter central de inserção periférica: revisão integrativa. Rev. Enferm. Atual. [Internet]. 2017 [acesso em 18 de novembro 2022];82. Disponível em: file:///C:/Users/profl/Downloads/admin,+09.pdf.

7. Marcias-Chapula CA. O papel da informetria e da cienciometria e sua perspectiva nacional e internacional. Ciênc Inf. 1998;27(2):134-40.

8. Araújo CA. Bibliometria: evolução histórica e questões atuais. Em Questão [Internet]. 2006 [acesso em 18 de novembro 2022];15(4). Disponível em: http://seer.ufrgs.br/index.php/EmQuestao/%20article/view/16.

9. Barreto ML. The challenge of assessing the impact of science beyond bibliometrics. Rev. Saúde Pública [Internet]. 2013 [cited 2022 nov

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http://dx.doi/10.9789/2675-4932.rectis.v4.12715
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2022];47(4). Available from: http://dx.doi.org/10.1590/S0034-8910.2013047005073.

10. Medeiros, JMG de; Vitoriano, MAV. A evolução da bibliometria e sua interdisciplinaridade na produção científica brasileira. RDCBI. [Internet]. 2015 [acesso em 18 de novembro 2022];13(3). Disponível em: https://periodicos.sbu.unicamp.br/ojs/index.php/rdbci/article/view/8635791.

11. Silva VRF, Meireles IB, Cheng C, Silva RCL, Silva CRL, Santiago LC. Análise bibliométrica de artigos sobre cateterização venosa periférica em pediatria. Cogit. Enferm. (Online). [Internet]. 2019 [acesso em 22 de abril 2022];24. Disponível em: http://dx.doi.org/10.5380/ce.v24i0.59232.

12. Cesario M, Cesario RR. Resenha do Livro: Pensamento Sistêmico: o Novo Paradigma da Ciência. Rev. bras. educ. [Internet]. 2019 [acesso em 18 de novembro 2022];43(1suppl 1). Disponível em: https://doi.org/10.1590/1981-5271v43suplemento1-20190114.

13. Price DJS. Little Science, Big Science - And Beyond [E-Book]. Columbia University Press; 1986 [cited 2022 nov 19]. Available from: https://scholar.google.com/scholar_lookup?title=Little%20science%2C%20big%20science&publication_year=1963&author=P.%20Dj.

14. Johnson MH, Cohen J, Grudzinskas G. The uses and abuses of bibliometrics. Reprod. biomed. online. [Internet]. 2012 [cited 2022 nov 19];24. Available from: https://doi.org/10.1080/08820538.2018.1443219

15. Montero PFJ, López-Muñoz F, Hidalgo SCF. Bibliometric analysis of the scientific production in the area of Optometry. Arch. Soc. Esp. Oftalmol. [Internet]. 2016 [cited 2022 nov 19];91. Available from: https://doi.org/10.1016/j.oftal.2015.10.014.

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