

REVIEW

BIBLIOMETRIC ANALYSIS OF ARTICLES ABOUT PERIPHERAL VENOUS CATHETERIZATION IN PEDIATRICS

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ABSTRACT

Objective: analyze the intellectual production on pediatric peripheral venous catheterization available in the database Scopus.

Method: bibliometric study focused on the electronically registered production between 1969 and 2018, using descriptive statistical analysis.

Results: 213 articles were retrieved, published in 123 journals. Nursing contributed with 21 (9.8%) articles in the health area. The United States led the ranking with 92 articles (43.1%). The study shows the limitations of the WebQualis journal ranking, showing that 41 (33.36%) journals are not part of any Qualis level.

Conclusion: the data elaborated in this study measured the contribution of the scientific knowledge deriving from the publications about catheterization. Therefore, its indicators can be useful for the planning and execution of further studies, and for the scientific community's knowledge on the system it is part of.


DESCRIPTORS: Nursing; Bibliometrics; Impact Factor; Catheterization, Peripheral; Pediatrics.


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ANÁLISE BIBLIOMÉTRICA DE ARTIGOS SOBRE CATETERIZAÇÃO VENOSA PERIFÉRICA EM PEDIATRIA

RESUMO

Objetivo: analisar a produção intelectual sobre cateterização venosa periférica pediátrica, disponibilizada na base Scopus.

Método: estudo bibliométrico que abordou a produção registrada eletronicamente de 1969 a 2018, com análise estatística descritiva.

Resultados: foram recuperados 213 artigos publicados em 123 periódicos. A Enfermagem contribuiu com 21 (9,8%) artigos da área de Saúde. Os Estados Unidos lideraram com 92 artigos (43,1%). O estudo mostra as limitações da estratificação de periódicos pelo WebQualis ao demonstrar que 41 (33,36%) periódicos não constam em nenhum estrato Qualis.

Conclusão: os dados elaborados por meio estudo mensuraram a contribuição do conhecimento científico derivado das publicações acerca da cateterização. Portanto, seus indicadores podem ser úteis para o planejamento e a execução de novas pesquisas, e para o conhecimento da comunidade científica sobre o sistema em que está inserida.

DESCRITORES: Enfermagem; Bibliometria; Fator de Impacto; Cateterismo Periférico; Pediatria.

ANÁLISIS BIBLIOMÉTRICO DE ARTÍCULOS SOBRE CATETERISMO VENOSO PERIFÉRICO EN PEDIATRÍA

RESUMEN

Objetivo: analizar la producción intelectual sobre cateterismo venoso periférico pediátrico, disponible en la base Scopus.

Método: estudio bibliométrico de la producción registrada electrónicamente de 1969 a 2018, con análisis estadístico descriptivo.

Resultados: fueron recuperados 213 artículos publicados en 123 periódicos. La Enfermería contribuyó con 21 (9,8%) artículos del área de Salud. Los Estados Unidos lideraron con 92 artículos (43,1%). El estudio muestra las limitaciones de la estratificación de periódicos por el WebQualis, demostrando que 41 (33,36%) periódicos no hacen parte de ningún estrato Qualis.

Conclusión: los datos elaborados mediante el estudio mensuraron la contribución del conocimiento científico derivado de las publicaciones acerca de la cateterización. Por lo tanto, sus indicadores pueden ser útiles para la planificación y la ejecución de nuevas investigaciones, y para el conocimiento de la comunidad científica sobre el sistema en que está insertada.

DESCRIPTORES: Enfermería; Bibliometría; Factor de Impacto; Cateterismo Periférico; Pediatría.

INTRODUCTION

For common sense, hospitalization is a condition that causes direct changes in the life of the human being, because of the imminent fact that the reason is the illness, but also because of the rupture with their social needs, especially the distance from their relatives, the latter being more devastating when it comes to children⁽¹⁾.

In the pragmatics of care, nursing professionals provide their patients with attention, guidance, physical assessment and other types of care through a range of techniques and procedures. These are performed as a result of the clinical condition and individual needs, not infrequently procedures that invade the body to different extents, mainly causing pain and suffering for the patients and their companions, as in the case of nursing care in pediatrics⁽¹⁾.

It is reasonable to assume that peripheral venous catheterization (PVC) is the most common procedure patients and nursing professionals experience in a hospital setting. It could represent a common necessity if two important aspects were not considered: the access route and the age of the patient who will undergo this procedure.

This proposition highlights PVC in pediatrics as a procedure performed repeatedly on the occasion of the children's clinical condition, added to their cognitive and motor capacity, to prolong the time of venous access, despite the presence at the bedside of a companion, which is usually the mother⁽²⁾.

For children, PVC represents a moment of physical and mental pain, suffering and stress, situations that may directly impact the treatment, and nevertheless, despite the relationship involving the trinomial - child/companion/nursing. One should also consider the environment⁽²⁾ that permeates the relationship, which is often unknown for the child and mother, or an environment recollected by both, as in the case of previous hospitalizations.

Researchers consider that children aged two to seven years are the most vulnerable to the effects not only of hospitalization but also of painful experiences because they have a developing cognitive and psychomotor structure, which explains the difficulty of this age group when undergoing this procedure⁽³⁾.

As a result of the multidisciplinary intervening factors in the implementation of PVC, as they involve aspects of Psychology, Sociology, Biology, Physics, Anatomy, among others, researchers from different areas of knowledge may have focused on seeking and proposing interventions in the practice of peripheral venous catheterization in children. Therefore, the state of the art of those studies may benefit from bibliometric studies like our research.

Bibliometric studies are based on a set of empirical laws and principles, deriving from information science, whose objective is to investigate the quantitative aspects of the production, dissemination and use of available and recorded information, thus contributing to the evaluation of the current state of science, as well as of research management⁽⁵⁻⁷⁾.

Bibliometric analysis, which includes the application of statistics to the bibliography, has three classically recognized laws: Bradford's Law (law of dispersion of scientific knowledge), Lotka's Law (law of author productivity) and Zipf's Law (frequency of words). Note that the main difference between bibliography and bibliometrics is that the latter mainly uses quantitative instead of discursive methods, which enhances the objectivity in the evaluation of scientific production⁽⁴⁾. Bibliometrics is not only concerned with the quantitative aspect though but also with verifying the relevance and impact of authors, journals, institutions, groups or countries in a wide range of knowledge areas⁽⁴⁻⁵⁾.

This research is justified by investigating the characteristics of the intellectual production on the topic of peripheral venous catheterization in pediatrics, and may contribute to other researchers in health or associated areas, as it will show the distribution of the production in time, by geographical area and knowledge, the impact of journals and the most productive authors, among others.

Even with a large volume of Nursing and Medicine books that discuss PVC, including in Pediatrics, there is little information about the current state of the art of academic research related to this subject, a fact that leads to the investigation of the following question: is the productivity level of authors and journals on pediatric peripheral venous catheterization correlated to bibliometric laws and principles of the intellectual production of authoring and publishing?

In order to answer this question through the use of bibliometric measure, we intend to analyze the intellectual production on pediatric peripheral venous catheterization, available in the database Scopus.

METHOD

In this bibliometric study, the production/dissemination and use of electronically recorded information in an international database was discussed, as published between 1969 and 2018. The analysis material was limited to articles indexed in the Scopus database, based on the following inclusion criterion: research and review articles published between 1969 and 2018, excluding articles with different scopes. The principle of bibliometrics includes the use of reliable indicators, which can be defined as parameters used in evaluation processes⁽⁵⁾.

The searches were carried out in the Scopus database in April 2018, using the descriptors [catheterization], [peripheral] and [pediatrics] and as a filter "article title, abstract and keywords".

The choice of the Scopus base is due to its acceptance in the Brazilian and international scientific community, especially in the health area, which provides abstracts and citations from peer-reviewed scientific literature, also offering a more comprehensive view of the global research production.

The descriptive analysis of the distribution of journals and authorship was processed using R® software, considering a 5% significance level (p -value = 0.05). Bivariate analysis was performed to compare the bibliometric behavior of the journals, their publication areas, and the Qualis ranking levels. VOSViewers software was used to calculate the strength of the links established between authors and co-authors, as well as of geographical areas, represented in the form of a map.

The chi-square test and the Shapiro-Wilk test were used to compare proportions, according to the number of journals and the normality test. For the quantitative variables, one-way analysis of variance (ANOVA) was used, followed by the Kruskal-Wallis test.

RESULTS

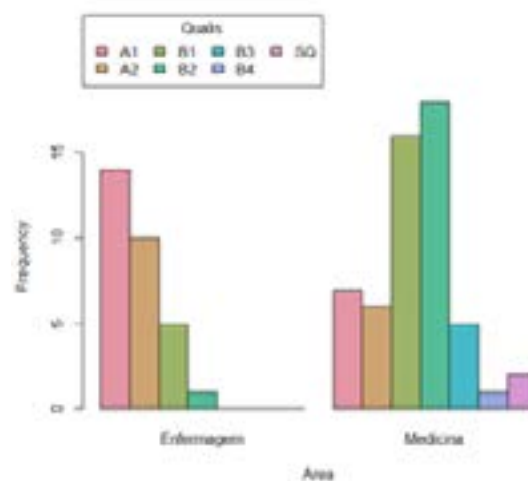
The search results revealed 213 documents published by 160 authors and 875 coauthors, 156 (73.2%) of which were original articles, 37 (17.3%) reviews, and 18 (9.5%) other modalities.

The average number of authors per article was 1.3. The most productive author published four articles, while the majority, 131 authors (81.8%), published one article. The geographical distribution of the retrieved publications shows the absolute leadership of the United States of America with 92 documents (43.1%), followed by Canada with 17 (7.9%) publications, while Brazil ranked 12th with four articles (1.8%). The other 32 countries together published 100 articles (46.95%). The geographic analysis of co-authorship identified 36 countries. The distribution considered only countries with at least two published articles, which resulted in less than half of the countries (15), while the remaining 21 did not publish more than one article.

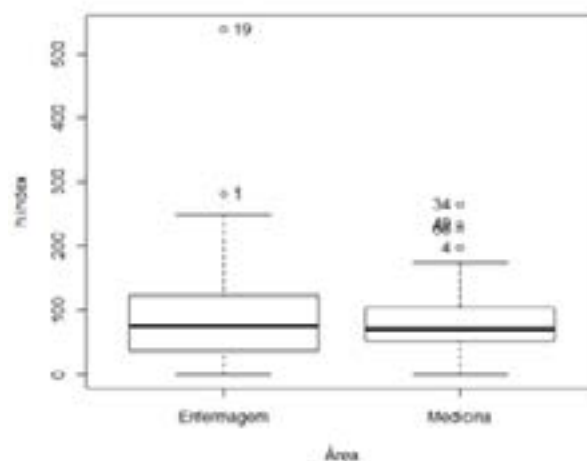
The language of the publications is mainly English with 196 (92%) articles, followed by French seven (3.2%), Spanish six (2.8%), German one (0.46%) and Portuguese three (1.54%).

The 213 articles were produced by 79 institutions, being 69 (87.3%) universities and 10 (12.7%) hospital institutions. The most productive university was the University of Toronto with six (2.81%) articles, followed by the University of Pennsylvania with five (2.34%). The University of Tennessee Health Science Center, Mount Sinai Hospital of the University of Toronto and the University of Connecticut also published four (1.87%) articles each. Eight institutions published three (1.40%) articles, 24 published two (0.93%) articles, and 43 (54.43%) institutions one (0.46%) article.

Nursing contributed with 21 (9.8%) articles from the Health area, second only to Medicine with 83 articles (38.9%). As regards the Knowledge Area/Qualis (Graph 1) and h Index/Area (Graph 2), we can observe that the Nursing journals are concentrated in A1 and A2, whereas the journals in Medicine are concentrated in B2 and B1. The Shapiro-Wilk test revealed p value > 0.05, which means that the sample follows a normal distribution. The Kruskal-Wallis test was used to evaluate the distribution in the variables h index and Area, resulting in p -value > 0.05, that is, they have the same distribution.



Graph 1 – Distribution of journals by Qualis levels. Rio de Janeiro, RJ, Brazil, 2018



Graph 2 – Distribution of journals according to h index/Area. Rio de Janeiro, RJ, Brazil, 2018

The 213 documents found are distributed in 123 journals, with an average of 1.7 articles per journal. The journal Pediatrics published 30 (14%) documents, which proves its significant contribution to the theme, as 53 journals (42.7%) published one document. The means, medians and standard deviations of Nursing, Medicine and SQ journals were, respectively, means - 66.43333, 57.34545, 65.23684; medians: 66.5, 54.0, 68.5; standard deviations - 38.39691, 36.87728, 31.49040.

The means, medians and standard deviations of the journals in the levels A1, A2, B1, B2, B3, B4 and SQ were, respectively: means - 53.95238, 72.12500, 68.57143, 56.78947, 56.80000, 50.00000 and 62.15000; medians - 52.0, 86.5, 66.0, 41.0, 37.0, 50.0 and 63.5; standard deviations - 32.69629, 36.96643, 35.63085, 38.43115, 56.05979 and NA 33.56322.

In Table 1, a short version of Bradford's Table is displayed, showing the journal's distribution and production. In the elaboration of the table, the number of journals (N. Journals) was concerned that is necessary to publish a certain quantity of articles (N. Articles).

Table 1 – Summarized Bradford table. Rio de Janeiro, RJ, Brazil, 2018

R*	N. Journals	N. Articles	Partial Σ
1	1	30	30
2	1	6	36
3	4	20	56
4	5	20	76
5	4	12	88
6	17	34	122
7	91	91	123
Total	123	213	123

*equivalent to serial order

Table 2 presents the comparison between the theoretical calculation and the empirical findings. The production of the journals was divided in three Zones, each of which contained 1/3 of the total of 213 articles. Therefore, Y, which represents the number of journals in Zone 1, equaled 9.

Table 2 – Bradford's theoretical and empirical calculation. Rio de Janeiro, RJ, Brazil, 2018

Zones	Theoretical Calculation		Empirical Calculation		
	Total articles	N journals	Total articles	N journals	In line
1 st	71	9	69	9	No
2 nd	71	27	71	40	No
3 rd	71	243	73	74	No

DISCUSSION

After these analyses, we can verify that the research corpus is consistent, as the data mining permitted the retrieval of the documents based on the main descriptors, delimiting the subject that was the focus of the research.

A sustainable increase in the number of publications was observed as from 2002, the largest number of publications being registered in 2013 but, nevertheless, the productivity of the periodicals was very irregular and dispersed.

Low productivity was also verified but, in contrast, the average number of co-authors was within the average allowed in most Brazilian and international journals, of a maximum of six authors per article.

It is quite reasonable to infer that the low rate of co-authorship is probably due to the low relevance of the subject in scientific publications. This finding is reinforced when looking for a possible elite group in the production of articles on the theme/subject. In this respect, for an established elite group to exist, the Elitism Law⁽⁵⁾ states that the members belonging to this group should produce at least 50% of the publications, which did not occur in this study.

In this case, the non-determination of an elite group in the empirical data stems from a large number of occasional authors⁽⁶⁾, which may strongly indicate the weak consolidation of the subject with the specific area of pediatrics or a state of obsolescence.

Based on the analysis of co-authorship, we can verify that scientific collaboration is one of the most researched attributes in the use of Social Network Analysis (SNA), as it provides the researcher with a broad view of the invisible colleges the branches of the research are immersed in, as well as a series of other findings regarding collaborative relations in the scientific field⁽⁶⁻⁷⁾.

In this respect, the comparison of the average number of co-authors with the institutions and countries of origin reveals that the Social Networks in the scientific scope are limited among authors whose affiliation is largely the same, except in the United States of America, United Kingdom, Canada, and Germany, which together constituted the largest inter-country collaboration network, followed by Australia and France.

English dominated as the language of the publications. This dominance can be easily explained, English being a universal language for science.

Brazil figures as the only country in Latin America that, like other countries, has no networks and is totally isolated. Based on this finding makes, we can infer with certainty that the level of international interaction of Brazilian researchers, and those of other countries that did not establish networks/links⁽⁷⁾, even after 49 years - 1969-2018, remains very fragile.

The average number of documents published per institution was low when considering the time cut studied and other studies in the nursing area⁽³⁾. Therefore, there was no institution that stood out quantitatively.

Applying Bradford's Law to verify the distribution/dispersion behavior of the journals, stated as: when constructing a table in descending order of the production of the journals on a certain subject, a nucleus of journals can be distinguished that is more dedicated to the research subject and several groups/zones with the same number of articles as the core group, but with a larger number of journals, as follows: (Zone 1 = Y), (Zone 2 = 3Y), and (Zone 3 = 3Y²). In this case, the number of journals with the same number of articles has the same number of articles.

From Tables 1 and 2, we could identify that, in none of the three zones, the empirical data are compatible and, therefore, in line with the behavior of Bradford's theoretical

model, only the first zone presented a greater approximation. This area included 69 articles in nine journals, while the theoretical model determined 71 articles in nine journals, the most devoted to publication on the issue. Pediatrics was the most productive journal, proving its specificity on the subject PVC.

The second Bradford Zone is not in line with the theoretical model used, which predicts a distribution behavior of 71 articles in 27 journals. The same happened with the third zone because it should contain 71 articles in 243 journals. The empirical behavior is out of line⁽⁷⁾ though, with 73 articles in 74 journals.

A significant number of journals are not stratified in WebQualis, despite being journals with a meaningful SJR (Scimago Journal Report) for the health area, as is the case of the journal *Anaesthesia*, third place in the ranking of journals that most focus on the research subject. That is, this important scientific vehicle has not yet received an article coming from Brazilian *stricto sensu* graduate programs and, therefore, has not yet been stratified.

No papers were found in levels B5 and C. These data show that, despite the low productivity, the articles are published in well-evaluated journals, which can raise the hypothesis that the small number of articles about PVC may be related to the low quality of the articles, that is, they are submitted, but are not recommended for publication.

Considering the registration time span in the database Scopus, we can infer that the subject has already reached its maturity⁽⁶⁻⁷⁾ and is in a state of obsolescent production, perhaps because the scientific community and/or the journals are no longer interested, despite the fact that some are extremely specific, but they do not present considerable production to demonstrate the importance/relevance of the subject.

CONCLUSION

Titles and abstracts of articles are considered relevant as they represent the scientific production on the subject. The results show the low production of studies, distributed in a wide range of knowledge areas, not restricted to health.

The potential use of bibliometrics can be considered a methodological informational treatment on the production of knowledge in different areas. Bibliometrics contributed to studying the production records. The structuring of databases facilitated the data collection and available software, in turn, speeds up the treatment and the quantitative analysis of those data.

Nursing researchers can benefit from the bibliometric analysis techniques, not only in a quantitative, but also in a qualitative approach, because the figures support the approximate reading of the reality and, as more in-depth studies are included, the wealth of the analyses becomes more representative. Therefore, bibliometric studies can contribute to revealing the connections between information from several areas of knowledge.

As for the authors, the small number of authors per article was evidenced and, as for the most productive, the study emphasized the journal that published their research, the institution they are affiliated with and their geographical location. In this respect, it is clear that the subject does not seem to arouse the interest of researchers to the extent of constituting intercountry and interinstitutional collaboration networks.

Although based on empirical facts, in this study, the laws of Bradford and Lotka were able to confirm hypotheses that the core group of journals consists of the most devoted and therefore most productive journals. Nevertheless, it revealed that the more specific the subject/theme, the more limited the possibility of identifying elite groups of authors.

The study shows the limitations of WebQualis journal ranking when evidencing that 41 journals (33.36%) are not included in any Qualis level, despite being journals with high

impact factor as measured by two different measures, SJR and h index.

Another important aspect that needs to be considered is the cognitive institutionalization of the knowledge areas in the domains of the articles and journals retrieved, which could be identified by the use of the three descriptors used. In spite of the grammatical standardization of the descriptors by a controlled vocabulary - DECs, the drawing of unreliable inferences can be configured in a limitation of this study.

As a contribution, the results of the study and its methodological design may serve as a basis for other proposals, thus filling a gap in bibliometric nursing research, such as the commitment to consolidate its body of knowledge, developing research that can simultaneously contribute to the growth and consolidation of this knowledge.

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Final approval of the version to be published - CRLS, LCS
