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# Portuguese nursing: analysis of knowledge production and dissemination through institutional repositories

Enfermagem portuguesa: análise da produção e divulgação do conhecimento através de repositórios institucionais

Enfermería portuguesa: análisis de la producción y difusión del conocimiento a través de repositórios institucionales

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## Abstract

**Theoretical framework:** Nursing bases its practices in analytical reasoning and the best evidence available. Institutional repositories add a new dimension to information management.

**Objectives:** To analyze the production and dissemination of nursing knowledge by scientific papers stored in institutional repositories of open access.

**Methodology:** Descriptive and documental study with data collected at 17 institutional repositories that have communities, collections or publications related to nursing. We analyzed the number and type of documents, year of publication, number of authors, research areas and keywords.

**Results:** In 1738 documents, we found: articles published in journals not indexed (31.2%); master's dissertations (30.3%); doctoral theses (4.1%); books (2.4%); book chapters (5.5%) and *articles not indexed* (8.5%). Since 2006, on average, published papers had a higher number of authors. We observed a significant increase in scientific production (70.7%) between 2010-2014.

**Conclusion:** The results show an increase in scientific productivity. As for the diffusion of knowledge we suggest the publication in indexed journals, and subsequent self-archiving in institutional repositories.

**Keywords:** nursing research; access to information; bibliometrics; databases.

## Resumo

**Enquadramento:** A enfermagem baseia as suas práticas no raciocínio analítico e na melhor evidência disponível. Os repositórios institucionais acrescentam uma nova dimensão à gestão da informação.

**Objetivos:** Analisar a produção e divulgação do conhecimento em enfermagem a partir de trabalhos científicos arquivados em repositórios institucionais de acesso livre.

**Metodologia:** Estudo descritivo e documental cuja informação foi obtida através de 17 repositórios com comunidades, coleções ou publicações relacionadas com enfermagem. Analisámos o número e tipo de documentos, ano de publicação, número de autores, áreas de pesquisa e palavras-chave.

**Resultados:** Dos 1738 documentos selecionados (31,2%) eram artigos não indexados; (30,3%) dissertações de mestrado; (4,1%) teses de doutoramento; (2,4%) livros; (5,5%) capítulos de livros e (8,5%) artigos indexados. Em média, a partir de 2006, os trabalhos publicados tinham um maior número de autores. Observámos um aumento significativo da produção científica (70,7%) entre 2010-2014.

**Conclusão:** Os resultados indicam aumento da produtividade científica. Em termos de difusão do conhecimento sugere-se a publicação em revistas indexadas e posterior arquivamento em repositórios institucionais.

**Palavras-chave:** pesquisa em enfermagem; acesso à informação; bibliometria; base de dados.

## Resumen

**Marco contextual:** La enfermería basa sus prácticas en el pensamiento analítico y las mejores pruebas disponibles. Los repositórios institucionales añaden una nueva dimensión a la gestión de la información.

**Objetivo:** Analizar la producción y difusión del conocimiento en enfermería a partir de trabajos científicos registrados en repositórios institucionales de acceso abierto.

**Metodología:** Estudio descriptivo y documental con datos obtenidos en 17 repositórios con comunidades, colecciones o publicaciones relacionadas con la enfermería. Se analizó el número y tipo de documentos, el año de publicación, el número de autores, las áreas de investigación y las palabras clave.

**Resultados:** De los 1.738 documentos seleccionados, el (31,2%) eran artículos no indexados; el (30,3%) trabajos de fin de máster; el (4,1%) tesis doctorales; el (2,4%) libros; el (5,5%) capítulos de libros y el > (8,5%) artículos indexados. De media, a partir de 2006, los trabajos publicados tenían un mayor número de autores. Se observó un aumento significativo de la producción científica (70,7%) entre 2010 y 2014.

**Conclusión:** Los resultados indican un incremento en la productividad científica. Respecto a la difusión del conocimiento, se sugiere publicar en revistas indexadas y, después, registrarlos en repositórios institucionales.

**Palabras clave:** investigación en enfermería; acceso a la información; bibliometría; base de datos.

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## Introduction

Traditionally considered as an art and science of caring, nursing has been developing over the last few decades into a discipline of knowledge whose practices are based on analytical reasoning and the best available scientific evidence. Thus, research in nursing contributes to the creation of its own epistemological body, with a view to improving care and assessing health outcomes (Estabrooks, Winther, & Derksen, 2004).

In the research field, however, and as Rodrigues (2009) underlines, the scientific knowledge is only truly knowledge when it becomes interknowledge (Rodrigues, 2009). The dissemination of project results and the publication of research with significant impact is essential, since knowledge communication, sharing and application are processes inherent in the making of science (Leite & Costa, 2006; Rodrigues, 2009).

In the nursing domain, a large number of the studies are published by higher education institutions (or associated research centres), while the remaining papers emerge from contexts of clinical practice (Dyniewicz, 2010; Sampaio, Carvalho, Araújo, & Rocha, 2014). International studies, using bibliometric techniques and electronic databases, point to an increase in productivity since the beginning of the 1990s (Estabrooks et al., 2004). There has been an increase in the mean number of authors per article and in the number of listed references, greater international collaboration in the studies, and a tendency to publish in journals with high impact factor (Huang, Ho, & Chuang, 2006).

To grow and gain visibility, the nursing profession should know its scientific productivity both in quantitative and qualitative terms (Dyniewicz, 2010). Therefore, the analysis of the research trends may translate the concerns about how nurses have been focusing on and responding to the problems inherent in care provision.

The main objective of this study was to analyse the production and dissemination of nursing knowledge based on scientific studies deposited in open access Institutional Repositories (IRs), available on the webpage of the Scientific Open Access Repository of Portugal (RCAAP), and published between January 1, 2000 and June 30, 2014.

## Background

An IR is an information system that stores, preserves and makes available digital copies of intellectual production of science-generating institutions, such as universities (Rodrigues, 2004).

IRs emerged all over the world, driven by the movement of open access to knowledge, and are today an important platform for information management and document preservation within the organisation itself, giving a new dimension to the management of global information in the Internet age (Bhardwaj, 2014). They also contribute to a greater institutional visibility, and may be used as tangible indicators of quality and productivity in education and research (Rodrigues, 2004).

IRs also operate as a scientific showcase, since the amount of times that a paper is cited is somehow related to the fact that it is digitally accessible without additional costs for the users. Thus, according to Harnad et al. (2004), researchers are currently faced with two roads to open access. One of them (the golden road) consists of publishing articles in open access journals; the other one (green road) consists of publishing in non-open access journals and then archiving the abstract, or the full paper (when authorised) in the repository of their institution.

Open access has an undisputable importance for evidence-based practice and research in nursing. As Nick (2012) reminds us, in some developing countries, the major scientific works are many years out of date and, even in developed countries, smaller universities and hospitals do not have the necessary budgets to enrich their libraries with updated journals. Thus, open access to documents increases the depth of nursing research studies, the replication of studies with comparison, the number of systematic literature reviews, and the update of clinical practice guidelines (Nick, 2012). The mere fact of creating new sources of information improves the quality of teaching, student learning, the professionals' training in clinical practice, the identification of the best available evidence, and, ultimately, health outcomes (De-la-Torre-Ugarte-Guanilo, Takahashi, & Bertolozzi, 2011).

If thematic and institutional repositories contribute to the dissemination, accessibility, and preservation of science, their mere existence, however, does not meet another one of the assumptions of science:

credibility. In this sense, it is important that the deposited documents have undergone recognised evaluation procedures, i.e. guidance or peer review processes. The dissemination of results in peer-reviewed journals is critical for sustaining quality care standards, as well as for developing advanced nursing and its evidence-based practices (Christenbery, 2011). Bibliometric studies provide information on the scientific activity of a discipline in a specific geographical context, such as objective data to help decision-makers in the respective area of knowledge (Donato & Oliveira, 2006). It is therefore important to identify, in line with the objective of this study, what types of scientific documents are produced in the several areas of nursing, the number of associated authors, how documents were published, and which are the dominant research areas.

## Research questions

The following questions guided the development of this study: What is the most common type of scientific document published between 2000 and 2014 in the nursing area and deposited in IRs?; What is the dominant type of study and technical-scientific areas?; How many authors, on average, does an article have, namely articles published in ISI/Scopus-indexed journals?; What are the most frequently used keywords?; The published articles were subject to guidance or peer review processes?

## Methodology

Taking into account the study objective and the research questions formulated, a documental search, and a quantitative and descriptive study were designed. The IRs of Portuguese hospitals, nursing schools, health schools, polytechnic institutes, and universities with departments and publications in the nursing area were accessed. Data were collected between July and September 2014, taking as starting point the web page of the directory of the RCAAP project, accessible at the following URL: <http://www.rcaap.pt/directory.jsp>. The first inclusion criterion was that the IR should be hosted on RCAAP, thus institutional libraries that were not hosted on this platform were not considered. A total of 76 IRs affiliated with RCAAP were found, and

17 of them met the second inclusion criterion: among its communities and collections, IRs should have scientific publications in the nursing area.

A total of 5658 documents related to nursing were deposited in the communities and collections of the 17 IRs. With the aim of restricting the analysis to relevant scientific production, and in line with the recommendations by Ferreiro-Alález (1993) and Umbelino (2009), a third inclusion criterion was used: only articles published in journals, master's dissertations, doctoral theses, abstracts, and full-text articles published in conference proceedings, book chapters, books, and technical-scientific reports ( $n=1754$ ) were considered. Therefore, for not meeting the third inclusion criterion, 3904 documents were excluded from the analysis, including monographs leading to a bachelor's degree, internship reports (when not leading to a master's degree), oral and poster presentations at conferences, debate moderations and academic lessons, pedagogical publications, and works from public examinations.

In order to restrict the analysis to more current data, a fourth inclusion criterion was applied to the 1754 selected documents: only those documents published after 2000 would be considered. Based on this fourth criterion, 16 documents published prior to that date were excluded.

Thus, a total of 1738 documents published between January 1, 2000 and June 30, 2014 were found. These documents were identified through its URI (Uniform Resource Identifier) and analysed taking into account the following variables: type of document, year of publication, number of authors, keywords, and information on peer review. These data are usually shown when opening of a document in a repository, as the different institutional web pages have similar designs.

In addition to the abovementioned variables, the type of study and the scientific area of nursing within which they were developed were also considered.

The variable 'type of study' was operationalised based on the following categories: theories and integrative reviews, research studies, and case studies. The first category included theoretical or conceptual studies, literature reviews, and integrative reviews. The category *research studies* included studies using a quantitative or qualitative methodology, systematic reviews, and meta-analyses. The category *case studies* included studies on a specific clinical situation and

reports on the application of the nursing process to an individual/family.

The documents were classified by scientific area taking into account the six traditional areas of nursing specialisation in Portugal: Medical-Surgical Nursing; Rehabilitation Nursing; Community Nursing; Mental Health and Psychiatric Nursing; Child Health and Paediatric Nursing; and Maternal Health and Obstetric Nursing. This criterion was chosen due to the fact that many nursing schools subdivide their repository collections according to this classification. However, during document analysis, the need was soon felt to add two new categories to this model which would more reliably reflect some of the themes addressed, namely: Administration; Health policies; Care management and fundamentals of Nursing; and Education; Training and clinical supervision; Ethics and Deontology.

In the distribution by type of study and scientific area, the titles, abstracts and, in cases of doubt, the full-text were analysed, aiming to minimise potential biases. The documents were divided into these variables after consensus was achieved in a meeting between the authors of this study.

With regard to scientific articles published in journals, the consulted repositories had different types of classifications. In fact, many libraries classified them as national and international; others as Medline-indexed or non-indexed; and others simply did not

classify them. The methodological strategy used in this study was to divide this type of documents into two categories: articles in journals indexed in *ISI Web of Knowledge* and/or in *Scopus* and articles non-indexed in these databases. These two indexing services were chosen given the fact that they are widely recognised by the Portuguese Foundation for Science and Technology. It was thus necessary to access the digital platforms of these databases and confirm that the articles were indexed.

Data obtained through these various sources (RCAAP, IR, web pages of *Web of Science* and *Scopus*) were successively extracted to a file created in the Statistical Package for Social Sciences (SPSS) software, version 20.0. The results were analysed and presented using the classic methods of descriptive statistics.

## Results

Table 1 shows the 17 IRs and the number of documents found in each of them. The following repositories should be highlighted: the Scientific Repository of the Nursing School of Coimbra, accounting for 34.3% of the records; the Digital Library of the Polytechnic Institute of Bragança (15.6%), and the Scientific Repository of the Polytechnic Institute of Viseu (15.1%).

Table 1

Documents published between 2000 and 2014, distributed by the consulted repositories

	N	%
Scientific Repository of the Nursing School of Coimbra	596	34.3
Digital Library of the Polytechnic Institute of Bragança	271	15.6
Scientific Repository of the Polytechnic Institute of Viseu	263	15.1
Open Repository of the University of Porto	173	10.0
Repository of the University of Évora	117	6.7
Repository of the University of Minho	97	5.6
Repository of Scientific Information of the Polytechnic Institute of Leiria	58	3.3
Repository of Central Lisbon Hospital Centre	45	2.6
Repository of the Polytechnic Institute of Castelo Branco	42	2.4
Scientific Repository of the Polytechnic Institute of Santarém	20	1.2
Repository of the Polytechnic Institute of Beja	19	1.1
Scientific Repository of the Hospital of Braga	13	0.7
Scientific Repository of the Porto Hospital Centre	12	0.7
Institutional Repository of the Coimbra Hospital and University Centre	5	0.3
Repository of the University of the Azores	3	0.2
Repository of the University of Trás-os-Montes and Alto Douro	2	0.1
Repository of the Hospital Prof. Dr. Fernando Fonseca	2	0.1
Total	1738	100.0

The most frequently found type of scientific document was the article published in non-ISI/Scopus-indexed journals (n=542). By analysing the trend for journals, it can be concluded that there has been a sustained growth over time in the number of articles published by Portuguese nurses in this type of journals (Table 2). Table 2 also shows that, until June 30, 2014, 526 master's dissertations were deposited in communities and collections related to nursing in open access repositories. A trend of exponential growth was observed in the number of works leading to a master's degree made available between 2010 and 2014.

Almost all abstracts in conference proceedings (n=165) were published after 2010 (n=149). Very similar results were obtained for full-text articles in conference proceedings.

With regard to articles published in indexed journals, only one record was found in the period 2000-2004, and 33 were published in the following five years, reaching a much higher volume after 2010 (n=114).

Book chapters and books accounted for respectively 5.5% and 2.4% of the documents. Doctoral theses represented 4.1% of the total number of records.

Table 2

*Type of documents published, between 2000 and 2014, in the nursing area and deposited in IRs*

	Period			N (%)
	2000-2004	2005-2009	2010-2014*	
Articles in non-ISI/Scopus-indexed journals	100	188	254	542 (31.2%)
Master's dissertations	51	21	454	526 (30.3%)
Abstracts in proceedings	2	14	149	165 (9.5%)
Articles in ISI/Scopus-indexed journals	1	33	114	148 (8.5%)
Articles in proceedings	1	14	112	127 (7.3%)
Book chapters	7	11	78	96 (5.5%)
Doctoral theses	15	21	35	71 (4.1%)
Books	8	16	18	42 (2.4%)
Technical-scientific reports	1	5	15	21 (1.2%)
Total	186 (10.7%)	323 (18.6%)	1229 (70.7%)	1738 (100%)

\*Until June 30, 2014.

After title and abstract reading, the documents were distributed according to the type of study (Table 3). A significant percentage of research studies was found (63.7%), followed by theoretical studies and integrative literature reviews (35.0%), and finally case studies (1.3%).

As for the number of authors in each study, it varied from a minimum of 1 up to a maximum of 12 authors, with a predominance of individual studies, regardless of the type of study.

Table 3

*Number of authors according to the type of studies published between 2000 and 2014*

Number of authors	Categories			Total
	Theories and integrative reviews	Research	Case study	
1	281	686	6	973
2	112	111	6	229
3	88	123	5	216
4	57	69	3	129
5	35	55	3	93
6	13	39	0	52
7	6	10	0	16
8	8	3	0	11

9	4	3	0	7
10	5	6	0	11
12	0	1	0	1
Total	609 (35.0%)	1106 (63.7%)	23 (1.3%)	1738 (100%)

Figure 1 shows the mean number of authors in the studies deposited in IRs since 2000 until now. Most nurses published individual studies at the beginning

of the century, a situation which reversed in 2006 when the trend started to be the publication of co-authorship studies.

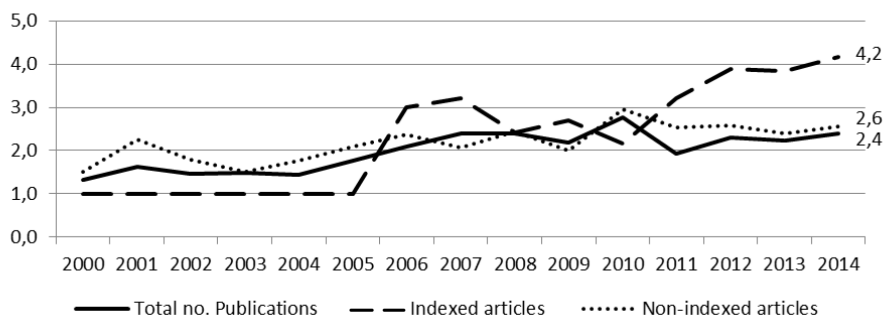


Figure 1. Mean number of authors after the year 2000, taking into account all types of documents, specifically indexed and non-indexed articles.

With regard to the context for study development (Table 4), it ranged from 5.9% in the area of Maternal Health and Obstetric Nursing to 11.6% in the area of Community Nursing. The category

'Administration. Health policies. Care management and Fundamentals of Nursing' obtained the highest number of records (22.9%).

Table 4

Distribution of documents by the traditional scientific areas of nursing

	N	%
Medical-Surgical Nursing	195	11.2
Rehabilitation Nursing	187	10.8
Community Nursing. Continuity of care	202	11.6
Mental Health and Psychiatric Nursing	148	8.5
Child Health and Paediatric Nursing	190	10.9
Maternal Health and Obstetric Nursing	102	5.9
Administration. Health Policies. Care management and fundamentals of Nursing	398	22.9
Education. Training and clinical supervision. Ethics and deontology	316	18.2
Total	1738	100

Figure 2 shows the ten most common keywords found in the publications. The most common keyword was *Enfermagem* (Nursing), with 130 records. The expression *Cuidados de enfermagem* (Nursing care) was found 61 times. The keyword

*Enfermeiros* (Nurses) was found 56 times, followed by *Familia* (Family) (55 times) and *Idosos* (Aged) (47 times). Finally, both descriptors *Dor* (Pain) and *Envelhecimento* (Ageing) obtained 30 records.

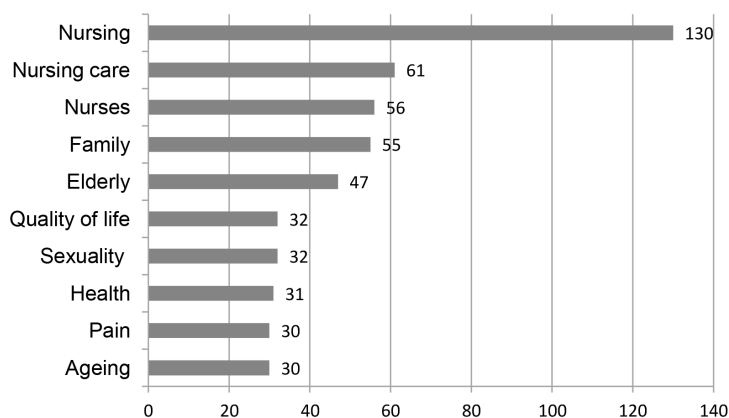


Figure 2. More common keywords in the documents.

It should also be noted that 93.8% of the 1738 documents found had scientific guidance (master's dissertations and doctoral theses) or were published after peer review.

## Discussion

Of the 17 IRs consulted, only four were IRs from hospitals or hospital centres, while the remaining 13 IRs were from higher education institutions. These findings are not surprising, since IRs are a key tool in the universities' scientific and academic management. However, we believe that more and more hospitals will invest in the implementation of these platforms in the near future, since these institutions are potential generators of knowledge and scientific productivity. As regards the type of documents, it was found that most researchers published their works in scientific journals, probably because journals are one of the main channels for communication, dissemination and legitimisation of science and technology (Leite, 2009; Portugal, Branca, & Rodrigues, 2011). Indexed articles accounted for a little more than 20% of the total number of articles published in journals. A more encouraging indicator emerged, however, from the comparative analysis of indexed articles over time, revealing a strong increase in this type of publications. Our results are in line with those found in other studies on the quality of the national scientific productivity in the health area found in the *Web of Science* platform and report growth rates ranging from 75% (Antunes, 2012) to 200% after the year 2000 (Donato & Oliveira, 2006).

The large number of doctoral theses and master's dissertations accessible for consultation should be highlighted, which is certainly a consequence of the creation of doctoral degrees in nursing and the relatively recent possibility for the schools to propose master's degrees in Nursing for accreditation by the Agency for Assessment and Accreditation of Higher Education (A3ES). This type of document can be a valuable asset to Portuguese nursing, both in terms of visibility and expansion of the communication flow, production of new evidence, and training of new researchers.

It should be emphasised that research studies were more predominant than theoretical studies and case studies, which seems to reflect the consolidation of the major conceptual frameworks and a predominance of problem-focused research.

After analysis of keyword matching, the following results were found, in descending order: nursing, nursing care, nurses, family, elderly, quality of life, sexuality, health, pain, and ageing. Using keyword extraction and comparison with MeSH (Medical Subject Headings) terms as criteria, Jeong, Ahn, and Cho (2005) found that *depression, elderly, stress, self-efficacy, quality of life, exercise, middle-aged women, and women* were the most common descriptors.

In this study, after the documents were classified, 59% of them were grouped into categories related to areas of nursing specialisation (Medical-Surgical Nursing; Rehabilitation Nursing; Community Nursing; Mental Health and Psychiatric Nursing; Child Health and Paediatric Nursing; and Maternal Health and Obstetric Nursing). Similar results were found in a study on research indicators in Irish nursing, in which the main



research areas identified were clinical practice (56%), professional issues (19%), and nursing education (25%) (McCarthy, Hegarty, & O'Sullivan, 2006).

The present study has some limitations. By restricting the search to IRs hosted on RCAAP, we are aware that many important documents archived in other institutional or thematic web pages would not be analysed. In addition, some bibliometric indicators of scientific quality, such as the journals' impact factor or the number of citations, were not taken into account in the analysis of the articles published in indexed journals.

## Conclusion

Despite these limitations, we believe that this study is a modest contribution to encourage other colleagues to develop studies using these and other bibliometric indicators aimed at assessing the impact, activity and scientific quality of Portuguese nursing.

By giving information on IRs, this research study could inform both practice and research, enhancing the consultation of documents archived in these databases, as well as encourage self-deposit by teachers and researchers.

Our results point to a significant growth in the amount of documents published over the last five years, which is in line with other studies. A trend towards an increase in the mean number of authors over the years was also observed, especially with regard to indexed articles. The results regarding the most recent years suggest a valorisation of partnerships in the process of scientific creation and publication.

Finally, one of the main reflections from this study relates to the need to continue improving productivity and, above all, the quality and dissemination of Portuguese nursing research. We believe that the publication in indexed journals of recognised quality, as well as its deposit in IRs, safeguarding copyrighted contents, should be the major focus of academics, researchers, and practitioners.

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