Scientometric analysis of nursing research on hip fracture: trends, topics, and profiles

Análise cienciométrica de pesquisas de enfermagem sobre fratura de quadril: tendências, tópicos e perfis

Análisis cienciométrico de estudios de enfermería sobre fractura de cadera: tendencias, temas y perfiles

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Abstract

Objective: Bibliometrics, scientometrics and other related methodologies can be used to reveal the basic patterns, links to different subjects and areas, and demographic elements of a particular topic within the literature. The aim of this study is to reveal the patterns and trends in nursing research on hip fracture.

Methods: This descriptive exploratory study can be classified in methodologies of bibliometrics, scientometrics and business intelligence. The Web of Science was the main data source. Related articles published between 1990 and 2020 were considered. In addition to tables, text analytics, and network models used in bibliometric mapping, Latent Dirichlet Allocation (LDA) enriched by business intelligence was utilized in the analysis of abstract data.

Results: The total of 380 studies on hip fracture were identified (article=351, review=29). The number of retrieved articles exhibit an increasing trend by year, the highest number of articles was published in 2020. In terms of distribution of the 380 studies by country, the United States (n=159), Sweden (n=52) and Australia (n=32) were the top three countries. Among the ten topics identified by LDA, nursing care, mortality, and rehabilitation were the prominent ones. Nursing, delirium, and elderly were the most frequently used keywords. Frailty and rehabilitation were the most recently introduced keywords.

Conclusion: The topics of nursing care, rehabilitation and care experiences have been studied intensively. Studies on issues that may occur with increasing age and where nursing care is important can be conducted in the future using business intelligence and bibliometric.

Resumo

Objetivo: Bibliometria, cienciometria e outras metodologias relacionadas podem ser usadas para revelar os padrões básicos, conexões com diferentes temas e áreas e elementos demográficos de um determinado tópico da literatura. O objetivo deste estudo é revelar os padrões e tendências na pesquisa de enfermagem sobre fratura de quadril.

Métodos: Estudo exploratório descritivo classificado em metodologias de bibliometria, cienciometria e inteligência de negócios. A Web of Science foi a principal fonte de dados. Foram considerados artigos relacionados publicados entre 1990 e 2020. Na análise de dados abstratos, além das tabelas, análise de texto e modelos de rede usados no mapeamento bibliométrico, também foi utilizada a Alocação Latente de Dirichlet (*Latent Dirichlet Allocation* -LDA) enriquecida por inteligência de negócios.

Resultados: Foram identificados 380 estudos sobre fratura de quadril (artigo=351, revisão=29). O número de artigos levantados apresentou tendência de crescimento a cada ano, o maior número de artigos foi publicado

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em 2020. Em termos de distribuição dos 380 estudos por país, Estados Unidos (n=159), Suécia (n=52) e Austrália (n=32) foram os três primeiros países. Dentre os dez temas identificados pela LDA, destacam-se os cuidados de enfermagem, mortalidade e reabilitação. Enfermagem, delirium e idoso foram as palavras-chave mais utilizadas. Fragilidade e reabilitação foram as palavras-chave introduzidas mais recentemente.

Conclusão: Os temas cuidados de enfermagem, reabilitação e vivências de cuidado têm sido intensamente estudados. Estudos sobre questões que ocorrem com o aumento da idade e onde o cuidado de enfermagem é importante podem ser conduzidos futuramente com uso de inteligência de negócios e bibliometria.

Resumen

Objetivo: Bibliometría, cienciometría y otras metodologías relacionadas pueden ser utilizadas para descubrir las pautas básicas, conexiones con diferentes temas y áreas y elementos demográficos de un determinado asunto de la literatura. El objetivo de este estudio es descubrir las pautas y tendencias en la investigación de enfermería sobre fractura de cadera.

Métodos: Estudio exploratorio descriptivo clasificado en metodologías de bibliometría, cienciometría e inteligencia de negocios. La principal fuente de datos fue Web of Science. Se consideraron artículos relacionados publicados entre 1990 y 2020. En el análisis de datos abstractos, además de cuadros, análisis de texto y modelos de red utilizados en el mapeo bibliométrico, también se usó la Asignación Latente de Dirichlet (*Latent Dirichlet Allocation*, LDA) enriquecida por inteligencia de negocios.

Resultados: Se identificaron 380 estudios sobre fractura de cadera (artículo=351, revisión=29). El número de artículos recopilados presentó una tendencia de crecimiento cada año, la mayor cantidad de artículos fue publicada en 2020. En términos de distribución por país de los 380 estudios, Estados Unidos (n=159), Suecia (n=52) y Australia (n=32) fueron los tres primeros países. Entre los diez temas identificados por la LDA, se destacaron cuidados de enfermería, mortalidad y rehabilitación. Enfermería, delirium y adulto mayor fueron las palabras clave más utilizadas. Fragilidad y rehabilitación fueron las palabras clave introducidas más recientemente.

Conclusión: Los temas cuidados de enfermería, rehabilitación y vivencias de cuidado fueron estudiados intensamente. Estudios sobre cuestiones que surgen con el aumento de la edad y donde los cuidados de enfermería son importantes pueden ser conducidos con el uso de inteligencia de negocios y bibliometría en un futuro.

Introduction

Hip fracture is a common problem especially in older adults. The annual incidence of hip fracture in the United States is more than 330,000[1] and in the United Kingdom 76,000.[2] The Organization for Economic Cooperation and Development (OECD) (2019) reported that averages are 182 per 100,000 population for hip replacement in the world.[3] As life expectancy is increasing worldwide, it is estimated that hip fracture, an important health problem and concern nowadays, will continue to be an important health problem in the future.[4] For this reason, a systematic and detailed examination of previous studies of patients with hip fracture can assist with the comprehensive assessment of healthcare services provided to these patients, which in turn, can guide the identification of problems related to the treatment/management of hip fracture and the implementation of preventive interventions. The approaches available for such an examination can be classified into bibliometrics and scientometrics. Scientometrics is a holistic methodology involving the multidimensional analysis of literature data using statistics, text analytics and network models, in addition to the visualization of relationships and patterns within the literature. In scientometric and bibliometric related research presenting bibliometric statistics, metrics such as the *H*-index, trend graphs regarding the number of publications, and network visuals including clustered text data are generally used to reveal the relationships within selected dimensions of the literature. When it comes to the creation of network visuals, software packages that apply social and clustering approaches are used.[5,6]

Various scientometric studies to investigate the literature on pain management, the nursing career, and caregivers in the nursing field have been performed.[7-9] These studies indicated that literature analyzes performed using bibliometrics and scientometrics can provide information on many different dimensions within a selected portfolio of papers as well as the related bibliometric data. The methodologies comprise both basic and advanced statistical techniques (i.e., network and text analytics) that can reveal beneficial findings and guide researchers.[7-9] The software packages developed for bibliometric and scientometric investigations produce static summary tables and network visuals on the basis of predefined dimensions with limited sets of parameters. Business intelligence tools that will work in-

teractively and dynamically according to the selected filters are required. In this way, instant answers to research questions can be found. In the present study, both the bibliometric software package results and business intelligence-based dashboards are presented together. To the best of the authors' knowledge, no study using both a software package for scientometrics and a novel reporting tool that works with the dashboard structure and developed based on business intelligence has previously been conducted. In order to further enrich this analysis, the outputs were merged with the time dimension from the data set in the business intelligence environment. By doing so, the changes in the topics over time could also be visualized. Word cloud, clustered bar charts for keyword distributions, and visuals for topic distributions by year comprised a dashboard in the business intelligence environment that can be navigated interactively. In this sense, a customized monitoring environment was developed to improve the quality of the research. The research design comprises four approaches and techniques, namely, bibliometrics, scientometrics, text mining, and business intelligence. Therefore, this study has an original structure due to its unique methodological setup, which added value in terms of the richness of both the analysis and the findings. As a result, the present study examines nursing research on hip fracture and explores which research frontiers could lead to collaborations between countries, journals, authors and citations, and reveals the keyword distribution within the papers.

Methods

Data for the present study comprised research articles on hip fracture in the field of nursing published between 1990 and 2020 in journals included in the Web of Science (WoS) database and indexed by SCI-Expanded, SSCI, A & HCI, and ESCI. Data were collected on January 8, 2021. Data required to perform a bibliometric analysis can be extracted from the WoS Core Collection. The contents include the entire record and the cited references in plain text and tab delimited file formats. The initial search for publications was performed on January 4, 2020, based on the titles, abstracts, and keywords of all articles published from January 1, 1990 to December 31, 2020. The search strategy was developed by inputting the term "hip fracture*". The asterisk was used as a wild card to retrieve documents containing "hip fracture". The identified dataset containing 23,721 articles was further filtered concerning the WoS nursing category, the article document types, and the all-years timespan. Ultimately, 380 articles were retrieved after the filter for analysis in this study.

Data were stored in plain text format and recorded relationally on the Oracle database via Hypertext Preprocessor (PHP) coding. The relevant fields were retrieved using Structured Query Language (SQL). Spreadsheets were also used for data transfers and summary tables.

Bibliometrics, scientometrics, and other related methodologies can be used to reveal the basic patterns, the links to different subjects and areas, and the demographic elements of a particular topic within the literature.[10] The first analyzes made within the scope of these methodologies consisted mostly of tables and graphs containing descriptive statistics and some metrics. By using the techniques obtained with the integration of text and network analytics, it was possible to explore the relationships and patterns between publications, authors, journals, research topics, countries, citations and to reveal them as visual maps. The network visuals revealed by means of this approach to analysis are referred to as bibliometric mapping, which represents a quantitative approach to visualizing various bibliometric aspects of scientific publications.[11] In this context, all inferences and visuals such as citation, co-citation, bibliometric coupling, co-authorship, co-occurrence networks developed based on clustering and social network analysis are covered within the scope of bibliometric mapping. By doing so, the holistic structure of the literature portfolio under discussion can be analyzed in different dimensions; this is one of the preferred techniques in many bibliometric studies.[12-16]

The present study induced scientific landscapes (for the content analysis) and bibliometric networks

or maps using the VOSViewer software package and the techniques embedded within this software (to present the co-authorship and co-citation).[17,18] In this study, a co-occurrence network was created over the identified keywords within the scope of bibliometric mapping. It is presented in two different visuals according to the time and word density. These visuals emphasize which keywords have been used intensively according to the frequency-based heatmap, highlight their association on the basis of their proximity/distance within the network, and reveal how up-to-date they are according to their colors.

Unlike many studies that adopt bibliometric mapping techniques, more detailed inferences were made from the content of papers via topic modeling on the abstracts within the scope of text mining. The changes in the time dimension of these inferences were also visualized.

The topic modeling approach, which is one of the components of the text mining technique, was used to obtain more detailed information on the contents of articles. Since text data are unstructured and contain non-functional components, a series of cleaning and preprocessing is performed first. Words that will not be used in the analysis are cleaned, format conversions are made and transformed into a matrix structure with a measure that will reflect the word frequencies, i.e., bag of words. In this way, text data are transformed into a numerical and structured form within the context of natural language processing. Therefore, before applying topic modeling, the abstracts were handled as documents and partitioned into words, all words converted into lowercase letters, and stop words were removed. The final document-term matrix was created by filtering the nouns from the remaining words. In terms of the topic modeling, groupings are made on the horizontal and vertical axes of the matrix based on the distribution of words grouped in the abstracts.

A topic is a distribution over a set of words, and the topic modeling technique treats each document as a combination of topics. In this sense, the topics form the semantic structure of the text. In the present study, this structure was used to highlight the basic concepts within articles as well as the research categories related to the common subject structures in the literature.

Latent Dirichlet Allocation (LDA), a popular topic modeling approach, was applied in this paper. The LDA and text preprocessing prior to the topic modeling was performed in RapidMiner Studio, a data science and business intelligence modeling platform. The number of topics serves as the user parameter, and the appropriate number of topics can be determined by comparing the perplexity metric. Certain common preferences and suggestions can be encountered even if there are no standard rules in relation to the selection of parameters and metrics.[19] In the present study, the appropriate number of topics was determined to be ten. Two main outputs can be obtained when an analysis is performed using the LDA approach. The first output is the document-topic matrix. Based on this matrix, the most relevant topic of each summary can be determined. Then, by grouping these topics within themselves, articles on the same topic can be revealed. The second output is the word-topic matrix. This matrix is based on the number of words determined by the user, the words that stand out for each topic (i.e. have a high score) can be seen. In both matrices, the subject groups are determined by the distribution of the words together, although they do not provide information about the subject. Thus, the researcher can decide what the topic is by looking at the abstracts within the same subject group as well as the prominent words concerning each subject. In this study, the matrices were enriched by adding other features such as the year and journal. In this way, the business intelligence environment could create multidimensional visuals in Power BI.

Results

Trends in publications

In the field of nursing, 380 studies on hip fracture were reached (article: 351, review: 29). An increasing trend was identified in terms of the number of

hip fracture articles in the nursing field over the years (Figure 1a). The *H*-index value for the 380 studies was 35 and 4,802 papers cited these 380 studies. With regard to publication counts, 2020 was the most productive year throughout the sample period. There was also an increasing trend in terms of the number of articles in general over the years.

Topic and keyword distribution
A total of ten topics were identified by means of the LDA. The variation in the ten topics obtained over the years is expressed in figure 1b. The topics comprised the activities of daily living (Topic 0), pain management (Topic 1), rehabilitation (Topic 2), pressure ulcer (Topic 3), delirium (Topic 4), nursing care (Topic 5), care experiences (Topic 6), mortality (Topic 7), post-hip-fracture care process (Topic 8), and hip fracture due to osteoporosis and risk factors (Topic 9). With regard to the distribution of topics by year, the first three topics were nursing care (Topic 5), mortality (Topic 7), and rehabilitation (Topic 2).

When the 380 articles were evaluated regarding the number of keywords used, the most frequently used keywords associated with the term "hip fracture" were nursing (n=44), delirium (n=27), elderly (n=21), older people (n=18), osteoporosis (n=17), older adults (n=16), rehabilitation (n=15), nurses (n=15), fall (n=12), dementia (n=11), pain (n=10), and activities of daily living (n=10). The most intensely used keywords in the articles and their distribution according to the year are presented in figure 2a and figure 2b, respectively. In recent years, the distribution of keywords was focused on frailty, rehabilitation, meta-analysis, etc.

The word cloud created using the MS-Power BI program is shown in figure 3a. Abstract, title and keyword data were cleaned and blended, and the weighting was performed by considering the number of repetitions according to the number of publications, not according to the total number of repetitions of words. Figure 3b presents the distribution of the ten topics according to the journals in which the relevant articles were published, as well as the number of repetitions (Figure 3).

Authors, countries, and journals
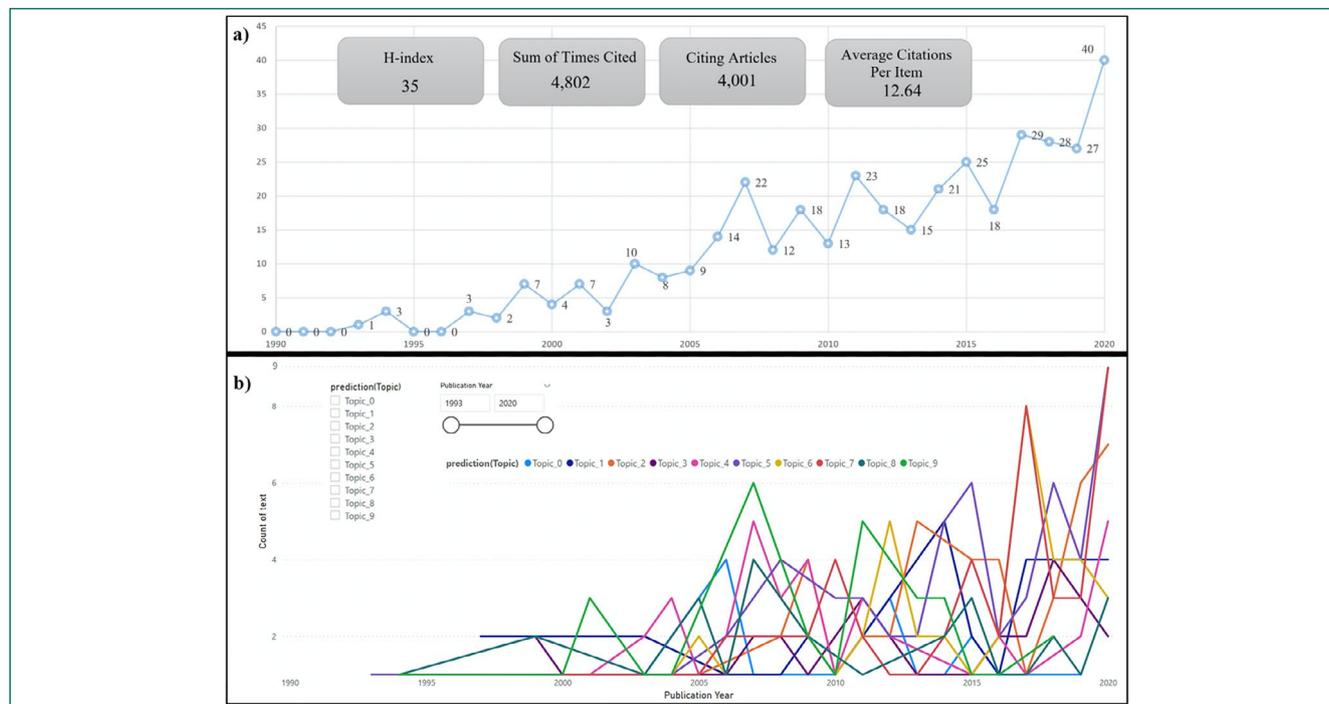The 380 examined studies were conducted by 1,175 researchers. Among the authors, on the

Figure 1. Number of articles (a) and distribution of topics by year (b)
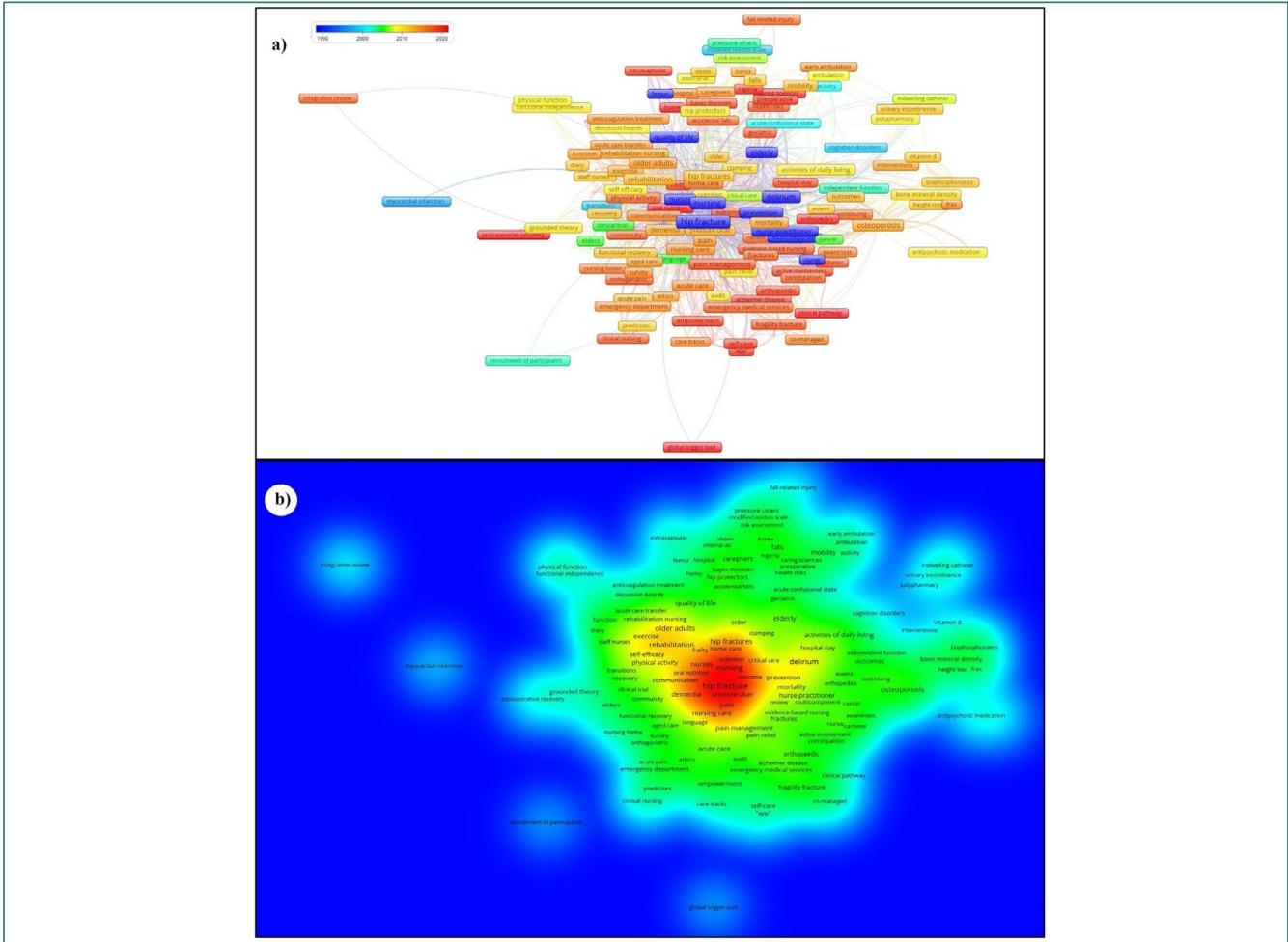
Figure 2. Distribution and density of keywords by year (a) and density (b)

Figure 3. Distribution of keywords as a word cloud (a), distribution of topics by journal (b)

Chart 1. Top 20 authors producing articles on the related subject

Rank	Authors (AMCP)	Organizations	Country	H- Index	STC	RC	ACPI	%
1	Resnick B (20)	University of Maryland Baltimore	USA	10	258	17	15.18	4.474
2	Shyu YI (21)	Chang Gung University	Taiwan	7	143	14	10.21	3.684
3	Wu CC (21)	Chang Gung Memorial Hospital	Taiwan	6	125	11	11.36	2.895
4	Magaziner J (20)	University of Maryland Baltimore	USA	6	154	9	17.11	2.368
5	Orwig D (20)	University of Maryland Baltimore	USA	5	119	8	14.88	2.105
6	Chen MC (22)	Chang Gung University	Taiwan	5	132	7	18.86	1.842
7	Hommel A (23)	Lund University	Sweden	5	62	7	8.86	1.842
8	Nahm ES (20)	University of Maryland Baltimore	USA	7	152	7	21.71	1.842
9	Milisen K (24)	Ku Leuven	Belgium	6	124	6	20.67	1.579
10	Cheng HS (21)	Chang Gung Memorial Hospital	Taiwan	5	92	5	18.40	1.316
11	Herr K (25)	University of Iowa	USA	5	215	5	43.00	1.316
12	Liang J (21)	Chang Gung University	Taiwan	5	72	5	14.40	1.316
13	Baath C (26)	Karlstad University	Sweden	4	50	4	12.50	1.053
14	Kondo A (27)	Chubu University	Japan	3	17	4	4.25	1.053
15	Larsson G (28)	Karlstad University	Sweden	2	50	4	12.50	1.053
16	Lee J (29)	Kyung Hee University	South Korea	1	3	4	0.75	1.053
17	Li HJ (21)	Chang Gung Memorial Hospital	Taiwan	4	61	4	15.25	1.053
18	Lin PC (30)	Taipei Veterans General Hospital	Taiwan	3	78	4	19.50	1.053
19	Lindholm C (31)	Uppsala University	Sweden	4	142	4	35.50	1.053
20	Pedersen PU (32)	Aalborg University	Denmark	3	73	4	18.25	1.053

* Sum of Times Cited: STC; Record Count: RC; Average Citations Per Item: ACPI; Author's Most Cited Paper: AMCP

basis of the number of articles produced, the first three productive authors were found to be Resnick B. (n=17), Shyu Y.I.L (n=14), Wu C.C. (n=11) (Chart 1). In addition, the authors' most referenced papers are listed in chart 1. As shown in the chart, some researchers work in the same institution or even together. In terms of the distribution of the 380 studies by country, the United States (n=159), Sweden (n=52), Australia (n=32), Taiwan (n=30), and England (n=26) were the top five countries. Moreover, the top five journals in which the studies were published were the Journal of Clinical Nursing (n=39), International Journal of Orthopedic and Trauma Nursing (n=37), Orthopedic Nursing (n=33), Journal of Advanced Nursing (n=24), Scandinavian Journal of Caring Sciences (n=16).

Highly cited articles

Among the 380 articles included in this study, the top ten articles in terms of having the most citations respectively were: "Fall risk factors in older people with dementia or cognitive impairment: a systematic review" (Citation Count (C):99, 2009, Journal of Advanced Nursing), "Delirium is asso-ciated with poor rehabilitation outcome in elderly patients treated for femoral neck fractures" (C:88, 2005, Scandinavian Journal of Caring Sciences), "Malnutrition in hip fracture patients: an intervention study" (C:75, 2007, Journal of Clinical Nursing), "A randomized clinical trial of the effectiveness of a discharge planning intervention in hospitalized elders with hip fracture due to falling" (C:65, 2005, Journal of Clinical Nursing), "A cost-effectiveness study of a patient-centered integrated care pathway" (C:64, 2009, Journal of Advanced Nursing), "Outcomes of inpatient mobilization; a literature review" (C:60, 2014, Journal of Clinical Nursing), "Nutritional care: the effectiveness of actively involving older patients" (C:60, 2005, Journal of Clinical Nursing), "Elderly patients with a hip fracture: The risk for delirium" (C:53, 2003, Applied Nursing Research), "An integrated review of the literature on challenges confronting the acute care staff nurse in discharge planning" (C:52, 2011, Journal of Clinical Nursing), "The appearance and disappearance of cognitive impairment in elderly patients during treatment for hip fracture" (C:52, 1997, Scandinavian Journal of Caring Sciences).

Statistics concerning citations in references

In the 380 articles included in the present study, there were 3,770 cited references, 83 cited journals, and 8,814 cited researchers (according to the first author). Of the 380 articles, 215 received a minimum of ten citations, indicating that research on hip fracture has attracted interest and inspired other studies. When it comes to citations, the top five articles on hip fracture were "Outcomes of older people admitted to post-acute facilities with delirium" (C:30, 2005, Journal of the American Geriatrics Society), "A multicomponent intervention to prevent delirium in hospitalized older patients" (C:22, 1999, The New England Journal of Medicine), "A nurse-led interdisciplinary intervention program for delirium in elderly hip-fracture patients" (C:20, 2001, Journal of the American Geriatrics Society), "Delirium is independently associated with poor functional recovery after hip fracture" (C:19, 2000, Journal of the American Geriatrics Society), "A short portable mental status questionnaire for the assessment of organic brain deficit in elderly patients" (C:18, 1975, Journal of the American Geriatrics Society).

Discussion

The present study sought to examine the research on hip fracture in the field of nursing and determine which frontier research topics could lead to collaborations between countries, journals, authors, and citations. Additionally, the study explored the keyword distribution of the examined articles. Data were analyzed by means of scientometrics and business intelligence methodologies. The *H*-index value of the 380 examined studies was 35. The *H*-index was proposed by Hirsch (2005) and is an indicator designed to measure publication activity and citation efficiency in combination and to evaluate scientists academically.[33] In this study, most articles on hip fractures in the field of nursing were published in 2020, with an increasing trend over the years. This trend can be explained by the fact that hip fracture is an important health problem for the elderly and given the increase in population ageing worldwide.[4] With rising life expectancy throughout the globe, the number of elderly individuals is increasing in every geographical region, and it is estimated that the incidence of hip fracture will rise from 1.66 million in 1990 to 6.26 million by 2050.[34] Based on this information, it is estimated that hip fracture, an important health concern nowadays, will continue to be an important health problem in the future. As a result, it is expected that the increasing trend in terms of research on hip fractures will continue in the future.

This study found that the most productive authors and institutions in this area were from the USA. This result can be explained by high-income countries having higher age standardized hip fracture rates, indicating that increased socioeconomic status, life expectancy and urbanization are correlated with hip fracture rates.[35] It is estimated that there are between 260,000 and 300,000 admissions for hip fractures in the USA annually, with projections of more than 500,000 per year by 2040.[36]

The topic "mortality" was also important in the present study. Hip fractures occur predominantly in frail older people who have a high baseline mortality risk. Many studies have demonstrated that hip fractures additionally increase the risk of death.[37,38] The cumulative mortality rate within three months after hip fracture was 25.0%, while the cumulative mortality rate for 1.2 years was 62.1%.[39]

The most densely studied topic was "nursing care". In addition, when the distribution of keywords by year was examined, the use of "nursing" and "care" keywords has increased in recent years. The reason for this increase is likely linked to the fact that healthcare professionals, especially nurses, play an important role in meeting the care and rehabilitation needs of patients during the long process of healing following hip fracture.[40,41] Nurses maintain close contact with patients and caregivers, so it is appropriate that they provide interventions to patient-caregiver dyads, which could prove highly beneficial for promoting general health.[9] Furthermore, the emphasis in the current literature that nursing care improves patient

outcomes also supports the present finding.[40,41] Another remarkable finding of this study concerns the topic of "care experiences". It has previously been suggested that revealing the experiences of hip fracture from the perspectives of patients, family caregivers, and healthcare professionals enables the determination of which facilitators would help to eliminate problems and improve the healing process.[40-42] This finding is likely given the widespread understanding of the importance of care experiences in relation to identifying and meeting patients' needs throughout the post-hip-fracture healing process.

Another remarkable topic was "delirium", also interesting in terms of the keyword distribution by year. Delirium is the most common postoperative complication in elderly patients with hip fractures.[43,44] A meta-analysis demonstrated that approximately one-fourth of patients undergoing hip fracture surgery develop delirium.[44] Delirium in this patient population is associated with a higher risk of prolonged hospital stay,[43,44] greater morbidity, loss of functional independence, healthcare costs burden, and mortality. Therefore, the prevention and treatment of postoperative delirium are crucial to the prognosis of patients with hip fracture. For this reason, nurses should consider the potential development of delirium during follow up care of patients with hip fracture.

The topic "hip fracture and risk factors due to osteoporosis" was also found to be of importance in the present study. The prevalence of osteoporosis in older adults of the world was 21.7%.[45] Osteoporosis is the major cause of fractures in postmenopausal women and in older men. The incidence of osteoporotic fractures varies between 10% and 60%. The most serious problem caused by osteoporosis is hip fracture.[46,47] Recent studies have emphasized that the early diagnosis of individuals at risk of osteoporosis is important in terms of determining the measures to prevent fractures that may develop due to osteoporosis.

In the present study, one of the keyword distributions concerned "falls". Most hip fractures seen in elderly people occur as a result of low-energy trauma following a fall.[48,49] In a meta-analysis, older adults incidence rates were 60.1 per 1,000 person-years for hospitalized falls and 13.7 per 1,000 person-years for hip fractures.[49] Thus, falls represent an important risk factor for hip fracture. For this reason, becoming aware of the risk for falls and establishing health programs dedicated to the prevention of falls should prove useful in relation to preventing both falls and fall-related health conditions.

The topic and keyword findings concerning "rehabilitation" and "activities of daily living" in the present study were of particular interest. Following hip fracture, many elderly people did not reach their pre-fracture functional levels of mobility and activity, leading to substantial changes in their life, with long-term personal and social consequences.[50,51] Konda et al. (2021) reported that only 35.3% patients return to their pre-fracture functional levels and 48.4% patients experienced a loss in ambulatory status. It is certainly not easy for elderly patients to regain their pre-fracture functional levels.[52] Several studies have demonstrated that organized and comprehensive rehabilitation programs to improve mobility and physical activity prevent further fall and disability after hip fracture.[52,53] Home care, continuous care, and rehabilitation following hip fracture all serve to improve patients' physical functioning and daily living activities.[53,54] In the present study, when examining the keyword distribution, the use of "home-based rehabilitation" has been intense in recent years. A current meta-analysis suggested that home-based rehabilitation is associated with significantly improved mobility, daily activity, instrumental activity and balance after hip fracture.[53] This highlights the importance of home-based rehabilitation processes in relation to older patients who have experienced hip fracture.

This study has some limitations. The first one regards the impossibility of comparison with other studies due to the lack of previous bibliometric and scientometric studies related to hip fracture. The second is the fact that the data source of the research is limited to articles published in WoS between 1990 and 2020. Hence, the findings reflect the patterns and statistics based on this research portfolio. However, by considering the research categories of-

fered by WoS, indexing criteria and qualified journals within this scope, this study examined an adequate portfolio that contributes to the chosen field.

Conclusion

This study examined articles published between 1990 and 2020 in order to identify the topics within the research portfolio concerning hip fracture in the field of nursing. It adopted a systematic and comprehensive perspective to investigate the authors, institutions, countries, journals, keywords, citations, and references of the identified articles. The findings of this study could help to guide researchers working in this field in the future. In addition, the study revealed that the topics of nursing care, rehabilitation, and care experiences have been studied intensively. Older patients with hip fracture generally require long-term care and rehabilitation. Nursing care represents a critical part of this process. In the future, studies using business intelligence and bibliometric can be conducted on issues that may occur with increasing age and where nursing care is important. In addition, it may prove useful to conduct home-care studies among older patients with hip fracture. Delirium is another remarkable issue identified in this study, and nurses should make sure to evaluate and follow up patients with hip fracture in terms of delirium. Most studies about hip fracture in the nursing field are descriptive studies. We suggest the development of interventional studies to prevent hip fracture.

Collaborations

Celik B, Bilik O and Turhan Damar H, contributed to conception and design, drafting the article, revising it critically for important intellectual content, final approval of the version to be published. Damar M, Ozdagoglu G and Ozdagoglu A, contributed to acquisition of data, analysis and interpretation of data, drafting the article, revising it critically for important intellectual content, final approval of the version to be published.

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