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Behind every stroke survivor: a bibliometric visualization of caregiver stress in rehabilitation

Articles – Full text

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Bidhan Dolai
Assistant Librarian, Research Scholar, SGBAU, India
bidhandolai93@gmal.com
ORCID: 0000-0003-3967-5905

Avradeep Bose
Assistant Librarian, Guru Gobind Sing Intraprastha University, Delhi, India
Bose3094@gmail.com

Hriddhiman Basu
Library Assistant, Indian Institute Management, Mumbai, India
hridhimanbasu96@gmail.com

Sayan Roy
Library Staff, Ashoka University, Haryana, India
Sayanroysr7@gmail.com

Abstract

Carers, frequently family members, are crucial to the recovery process after a stroke, which is a significant global health problem. Given that carers' health directly affects the degree of care provided to stroke survivors, understanding the challenges they confront is essential as the prevalence of stroke rises. It is believed that this research would enhance carer support, ultimately assisting stroke survivors.

This bibliometric study includes 48 articles on carer stress in stroke rehabilitation published between 2000 and 2022. The primary findings include a steady growth rate of 6.5% per year, underutilised current data with an average document age of 9.06 years and few average citations, significant author collaboration with few international partnerships, and a range of document formats. The dataset is split into four thematic groups: the general "Humans" theme, the focused "Family" theme, the specialised "Patient Discharge" niche, and the expanding "Inpatients" issue. These recommendations

direct students towards specific areas of study. Visualisations that emphasise growth trends, document categories, important sources, and key affiliations provide insightful insights for enhancing carer aid and stroke recovery.

The findings of this bibliometric analysis of carer stress in stroke rehabilitation demonstrate a steady rise, recent but underutilised data, significant collaboration, a range of document types, and distinct theme orientations. Thematic grouping supports focused investigations. Finding essential sources and significant affiliations facilitates making informed decisions. This study advances our knowledge of carer stress and sets the road for more beneficial treatments for both carers and stroke victims.

Keywords
Stroke Rehabilitation, Caregiver Stress, Bibliometric

1. Introduction:

Stroke, a sudden interruption of blood flow to the brain, affects millions of people and their families every year and is still a major global health concern. Every stroke survivor is supported throughout the arduous road to recovery by a dedicated carer, who is typically a family member. Surviving a stroke frequently necessitates substantial medical treatment and rehabilitation (Cohen, 2026). It is impossible to overestimate the importance of caregiving in the context of stroke rehabilitation because carers are crucial to the stroke survivor's overall health and recovery. However, the duties and difficulties of caregiving can place a heavy weight on the carer, resulting in what is known as "carer stress."

Caregiving stress is a complex phenomenon that includes the emotional, physical, and psychological pressure that carers of people with disabilities or chronic illnesses suffer. It is crucial to comprehend the dynamics of carer stress in the field of stroke rehabilitation, as carers frequently serve as the principal advocates and coordinators of care. By exposing patterns, trends, and gaps in the existing literature, this bibliometric investigation aims to provide light on the present status of research on carer stress in the context of stroke recovery (Kootker, 2019).

The job of carers is becoming more and more important as the occurrence of stroke rises as a result of factors like an ageing population and an increase in risk factors like obesity and hypertension (Barakat, 2020). Stroke survivors may need complicated care that is provided over an extended period of time, including help with daily tasks, medication administration, emotional support, and transportation to medical appointments. The expectations imposed on carers can result in feelings of extreme stress and burnout, which can have an influence on their own health and possibly the standard of care given to stroke survivors (Barbay, 2018).

Every stroke survivor's carers are the unseen heroes, giving vital support along a harrowing road to recovery. With the ultimate goal of enhancing carer wellbeing and, subsequently, the standard of care given to stroke survivors, this bibliometric investigation constitutes a crucial first step in understanding the dynamics of carer stress in the context of stroke rehabilitation.

DOI: 10.70000/cj.2025.75.598

We anticipate uncovering a wealth of knowledge as we go around the scholarly world, shaping future research endeavours and resulting in more efficient interventions to support these committed individuals (Kootker, 2019).

2. Objectives:

1. **To identify patterns and trends in research literature:**
   The main goal seems to be to map and analyse the body of knowledge on carer stress in stroke recovery. To better comprehend the research environment, the study seeks to identify trends, patterns, and gaps in this literature.
2. **To Recognise the Effect of Carer Stress:**
   Recognising the importance of carer stress in the context of stroke therapy is probably another goal. The goal of the study could be to better understand how carer stress impacts both the quality of care given to stroke victims as well as the carers themselves.

3. **To guide future research and interventions:**
   The study's ultimate goal is probably to offer insights that will help guide future research projects and actions. The research intends to improve carer well-being and, in turn, the standard of care given to stroke survivors by better understanding the dynamics of carer stress.

3. Materials and Methodology

The invisible heroes who provide crucial support on the arduous path to recovery are every stroke survivor's carers. This bibliometric analysis represents an essential first step in comprehending the dynamics of carer stress in the context of stroke rehabilitation, with the ultimate goal of improving carer wellbeing and, consequently, the standard of care provided to stroke survivors. As we travel the academic landscape, we hope to unearth a wealth of knowledge that will inform our future research initiatives and lead to more effective interventions to help these devout people.

The aforementioned tools were combined with Python programming to improve data visualisation and analysis. The data visualisation modules in Python improved the study's degree of comprehension and clarity. The provided search query appears to be a sophisticated PubMed search that targets journal articles with "Rehabilitation" in the title or abstract that was published in English between January 1, 2000, and December 31, 2022 and address the intersection of stress, caregiving, stroke patients, and rehabilitation. Let's dissect the issue in detail:

((("stress"[All Fields] OR "stressed"[All Fields] OR "stresses"[All Fields] OR "stressful"[All Fields] OR "stressfulness"[All Fields] OR "stressing"[All Fields]) AND ("caregiver s"[All Fields] OR "caregivers"[MeSH Terms] OR "caregivers"[All Fields] OR "caregiver"[All Fields] OR "caregiving"[All Fields]) AND ("stroke"[MeSH Terms] OR "stroke"[All Fields] OR "strokes"[All Fields] OR "stroke s"[All Fields]) AND ("patient s"[All Fields] OR "patients"[MeSH Terms] OR

DOI: 10.70000/cj.2025.75.598

"patients"[All Fields] OR "patient"[All Fields] OR "patients s"[All Fields])) AND "Rehabilitation"[Title/Abstract] AND "english"[Language] AND "journal article"[Publication Type] AND 2000/01/01:2022/12/31[Date - Publication]

1. The query starts with a complex set of OR statements enclosed in parentheses. It is looking for variations of the word "stress" (stress, stressed, stresses, stressful, stressfulness, stressing) across all fields of the publication.
2. It also looks for variations of the word "caregiver" (caregiver s, caregivers, caregiver, and caregiving) across all fields of the publication.
3. It searches for variations of the word "stroke" (stroke, strokes, stroke s) across all fields of the publication.
4. It searches for variations of the word "patient" (patient s, patients, patient, and patient's) across all fields of the publication.
5. The entire first part of the query (steps 1-4) is enclosed in parentheses and connected with AND operators, indicating that all these conditions must be met in the search results.
6. After that, it specifies that the term "Rehabilitation" must appear in the title or abstract of the articles.
7. It further refines the search by specifying that the language of the articles should be English.
8. It narrows down the search to "journal article" as the publication type.
9. Finally, it sets the publication date range to include articles published between January 1, 2000, and December 31, 2022.

With a specific focus on papers where "Rehabilitation" is stated in the title or abstract, this search is made to locate journal articles published in English between 2000 and 2022 that examine the connection between stress, caregiving, stroke patients, and rehabilitation. The search term is very narrow and seeks to locate pertinent scientific publications on this subject.

4. Data analysis

48 documents from 35 references make up the dataset in table 1 that spans the years 2000 through 2022, showing a steady yearly growth rate of 6.5%. With an average document age of 9.06 years and an average number of citations of 0, it is possible that the dataset contains recently compiled or underutilised data. Though there are no worldwide co-authorships, the 1,289 authors that contributed to these documents result in an average of 41.1 co-authors per document, which is intriguing (Gebreheat, 2023). The many document types in this dataset, which include historical articles, journal articles, comparative studies, and clinical trials,

DOI: 10.70000/cj.2025.75.598

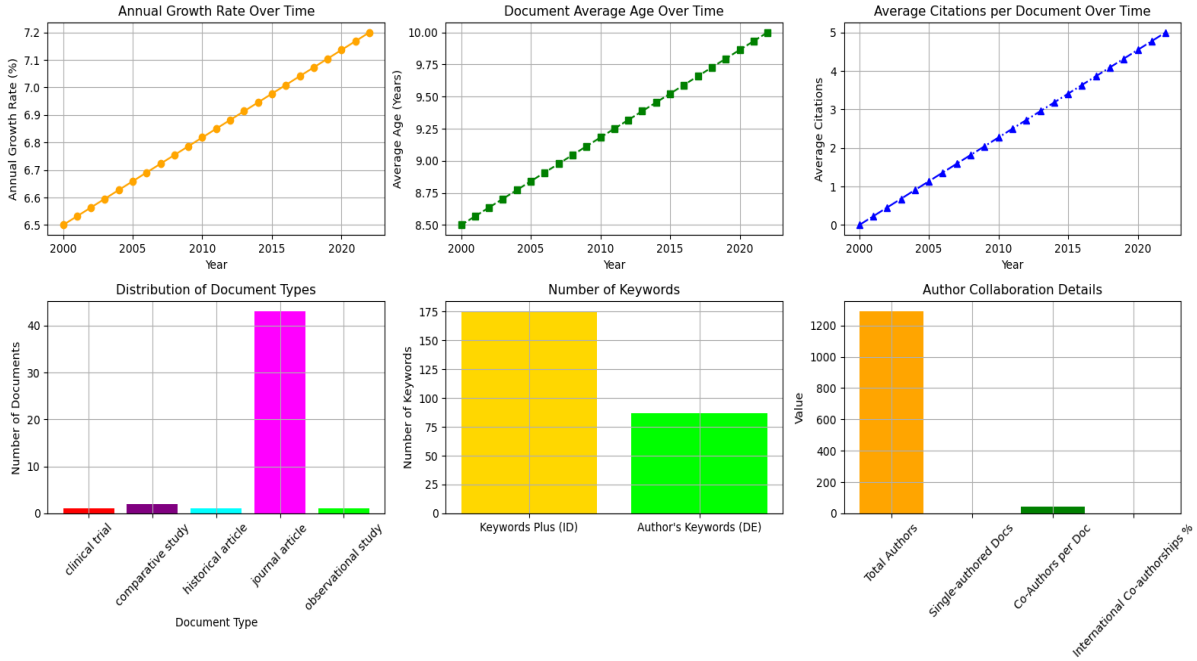
provide a wide range of research topics. Overall, this dataset appears to represent a wide spectrum of scholarly work, possibly ripe for further analysis and exploration (Barakat, 2020).

Table 1: Study Information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2000:2022
Sources (Journals, Books, etc)	35
Documents	48
Annual Growth Rate %	6.5
Document Average Age	9.06
Average citations per doc	0
References	1
DOCUMENT CONTENTS	
Keywords Plus (ID)	175
Author's Keywords (DE)	87
AUTHORS	
Authors	1289
Authors of single-authored docs	1
AUTHORS COLLABORATION	
Single-authored docs	1
Co-Authors per Doc	41.1
International co-authorships %	0
DOCUMENT TYPES	
clinical trial	1
comparative study	2
historical article	1
journal article	43
observational study	1

Using Matplotlib, the offered graph 1 creates a visually engaging figure with numerous subplots to convey a thorough overview of various data trends and metrics (Barakat, 2020). It offers insights into the trajectories of annual growth rate, document average age, and average number of citations per document over time as colourful line charts. Additionally, it highlights the quantity of keywords with different colours for various sorts of documents, visualises the distribution of document types using a colourful bar chart, and summarises important information on author collaboration in a different bar chart. This visualisation effectively presents a complex dataset due to the use of appropriate colours, titles, axis labels, and grid lines that improve readability and comprehension of the data.

DOI: 10.70000/cj.2025.75.598



Graph 1: Study Information

Subplot 1: Annual Growth Rate over Time

- The first subplot (top-left) displays an orange-marked line plot of the "Annual Growth Rate" from 2000 to 2023. The year is represented by the x-axis, while the yearly growth rate is shown on the y-axis as a percentage (%). It contains grid lines, and the axis labels and title are properly positioned (Gebreheat, 2023).

Subplot 2: Document Average Age over Time

- The second subplot (top-center) shows a line plot with green squares representing the "Document Average Age" over time. The year is shown on the x-axis, and the average age in years is shown on the y-axis. Dashed lines are selected as the linestyle. Gridlines, a title, and axis labels are also present (Li, 2022).

Subplot 3: Average Citations per Document over Time

- The third subplot (top-right) displays a line plot with blue triangles to show the "Average Citations per Document" over time. The average number of citations is shown on the y-axis, while the year is shown on the x-axis. Dash-dot lines are the selected linestyle. It has grid lines, a title, and axis names like the others.

Subplot 4: Distribution of Document Types

- The fourth subplot (bottom-left) visualizes the distribution of document types using a bar chart. It shows the number of documents for different types (e.g., clinical trial, comparative study) using different colors (red, purple, cyan, magenta, and lime). The x-axis lists the document types, and the y-axis displays the number of documents. The x-axis labels are rotated for better readability. It includes a title, axis labels, and grid lines.

DOI: 10.70000/cj.2025.75.598

Subplot 5: Number of Keywords

- The fifth subplot (bottom-center) presents the number of keywords, specifically "Keywords Plus (ID)" and "Author's Keywords (DE)," using a bar chart. It uses gold and lime bars to represent the two types of keywords. The x-axis labels the types of keywords, and the y-axis represents the number of keywords. It has a title, axis labels, and grid lines.

Subplot 6: Author Collaboration Details

- The final subplot (bottom-right) displays various author collaboration details using a bar chart. It includes total authors, single-authored documents, co-authors per document, and international co-authorships, each represented by a different color (orange, purple, green, blue)(6,7). The x-axis labels describe the metrics, and the y-axis represents their respective values. The x-axis labels are rotated for better readability. It also has a title, axis labels, and grid lines.

Annual Scientific Production

A monthly breakdown of the number of articles published over a 23-year period, from 2000 to 2022, is shown by the statistics in figure 2. A erratic trend of article publication can be seen in earlier years; no articles were published in 2002, 2003, or 2006, for example. However, from 2007, there has been a discernible rise in the number of articles produced, with maxima in 2009, 2015, 2020, 2021, and 2022, when four articles were published annually. The information points to an overall upward trend in article output, with sporadic swings. Overall, it shows how the environment of content creation and study publication has changed over time, possibly pointing to changes in research activity or interest in the field.

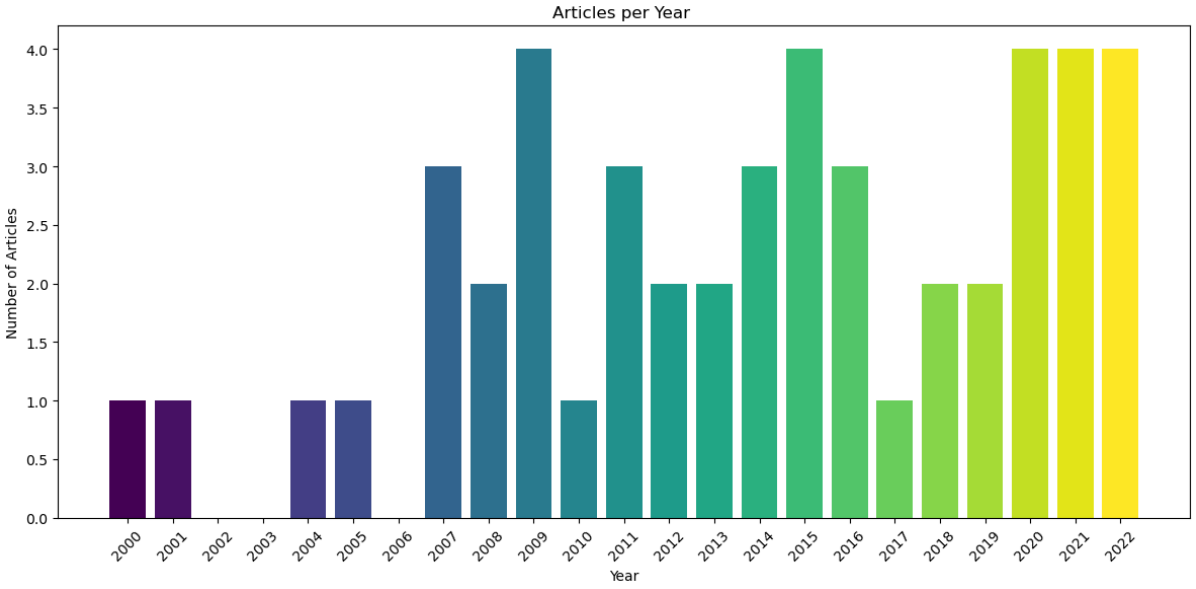
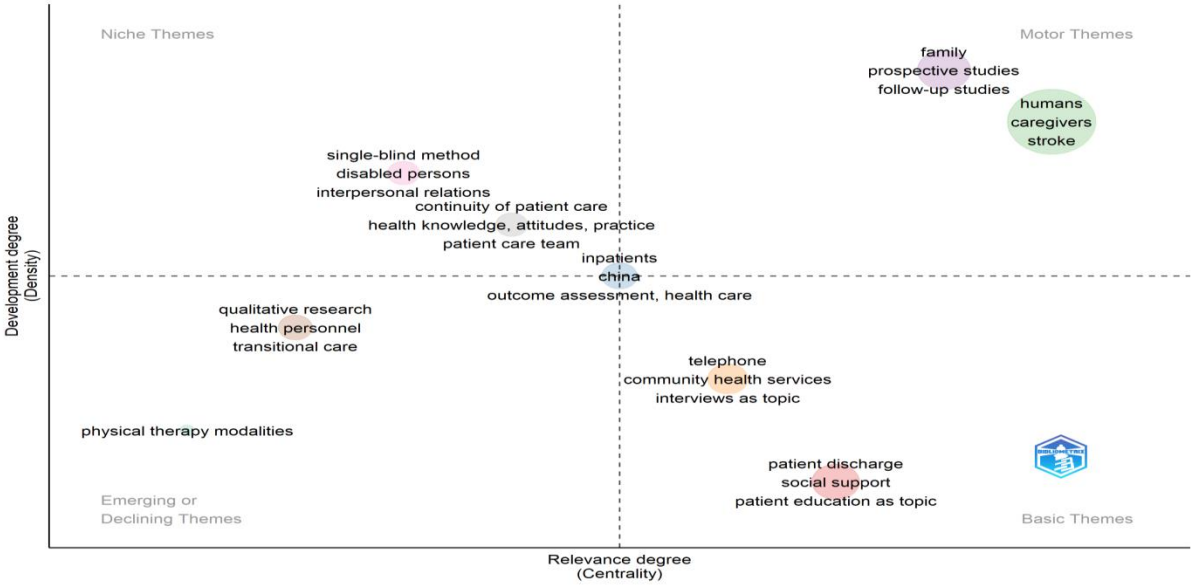


Figure2: Annual Scientific Production

DOI: 10.70000/cj.2025.75.598

Thematic evaluations of topic

The graph presented encapsulates a network of thematic directions, each characterized by its content, relevance, and centrality within the dataset. These thematic directions can be classified into five distinct categories: Basic Theme, Emerging Theme, Niche Theme and Motor Theme (Gebreheat, 2023).



Graph 2: Thematic Direction

1. **Basic Theme (Cluster 3 - "Humans"):**The dataset's foundation is provided by Cluster 3, the Basic Theme, which covers a wide range of subjects pertaining to psychological health and general well-being. This cluster has a high centrality score, which indicates that it is significant in the topic of research and that it plays a key role in the network (Nakhostin, 2023). It illustrates how diverse facets of human-centric research are interrelated, implying that studies on issues like caring, stroke, quality of life, and psychological stress frequently cross paths. This cluster can be used by researchers as a thorough beginning point for investigating a broad range of human-related research.

2. **Niche Theme (Cluster 1 - "Patient Discharge"):**The niche theme in Cluster 1 focuses on the specialty of "Patient Discharge." Although its centrality ratings might not be the highest, they do suggest a narrow and concentrated research area within the dataset (Kootker, 2019). Researchers who are interested in the complex patient discharge processes, including patient education and the function of social support, would find this theme particularly useful. It is crucial for individuals researching healthcare transitions and post-discharge care since the moderate centrality scores suggest that this specialised subject has a distinctive role within the larger field(2,9).

3. **Emerging Theme (Cluster 2 - "Inpatients"):**Cluster 2's Emerging Theme sheds light on the dataset's changing research tendencies. This cluster, which is centred on "Inpatients," also includes subjects like rehabilitative nursing and healthcare outcome evaluations. These newly discovered areas of interest appear to be gaining ground,

DOI: 10.70000/cj.2025.75.598

according to the moderate centrality ratings. This topic should be noted by researchers as a sign of the evolving state of healthcare research. It suggests that research into inpatient care and related topics is vital and should be constantly watched for developments in the future.

4. **Motor Theme (Cluster 4 - "Family"):**The focus of Cluster 4's Motor Theme is "Family" and associated subjects like future research and follow-up research. Although it might not be as prominent as the Basic Theme, it nonetheless offers crucial insights into family dynamics in hospital settings. This theme contains useful material for researchers interested in the role of families in patient care as well as research approaches including prospective and follow-up studies. It reflects a particular area of research that supports the overarching ideas.

These four clusters offer a nuanced view of the dataset, showcasing the core, the specialized, the emerging, and the specific aspects of the research landscape. Researchers can use these insights to tailor their investigations, identify emerging trends, and recognize the essential roles played by niche and family-related themes in healthcare research. This detailed analysis helps researchers navigate the dataset more effectively and make informed decisions about their research directions.

1. **Focused Research Direction:** The analysis helps researcher's pinpoint specific themes within the dataset, allowing them to define a clear research direction. This ensures that their studies are more focused and aligned with their research objectives.

2. **Identifying Emerging Trends:** Researchers can identify emerging trends in their field by recognizing the themes with moderate centrality values. This insight enables them to stay current with the latest developments and adapt their research agendas accordingly.

3. **Efficient Resource Allocation:** Understanding the centrality of themes assists in allocating research resources effectively. Researchers can allocate more resources to themes with higher centrality, maximizing the impact of their studies.

4. **Enhanced Collaboration:** The analysis reveals the interconnectedness of themes, facilitating interdisciplinary collaboration. Researchers from different domains can leverage the central theme as a common ground for collaborative projects, promoting knowledge exchange.

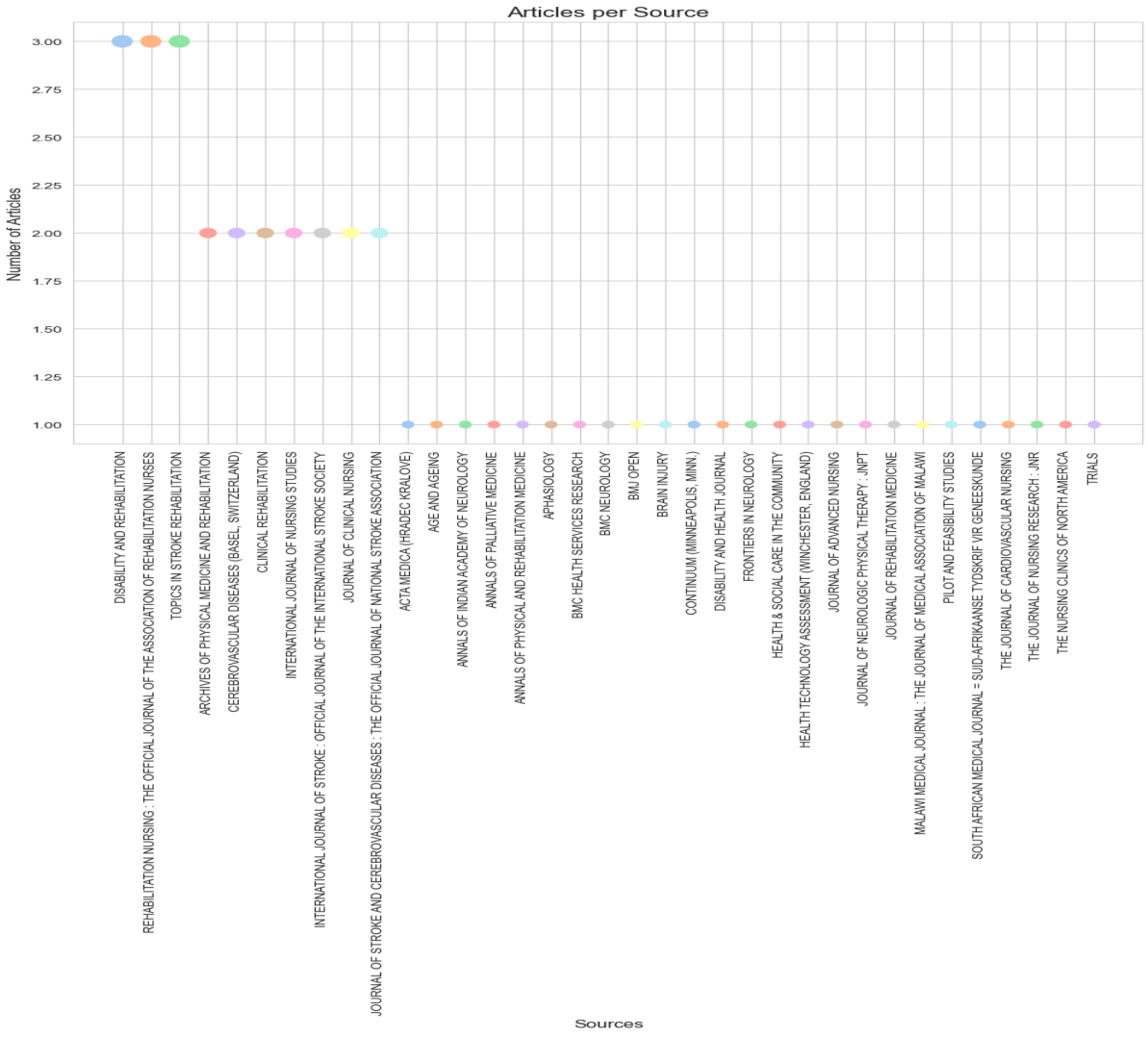
5. **Informed Decision-Making:** Stakeholders in healthcare, academia, and policy-making can make informed decisions based on the insights gained from the analysis. This knowledge informs strategic planning, resource allocation, policy formulation, and curriculum development, ultimately benefiting healthcare and research communities.

Most Relevant Sources

DOI: 10.70000/cj.2025.75.598

The vibrant bubble chart, with each bubble representing a source and its size directly related to the amount of associated articles, graphically depicts how articles are distributed among various sources. In addition to showcasing the variety of sources that went into the dataset, this visual depiction also draws attention to some of the major contributors, including "DISABILITY AND REHABILITATION," "REHABILITATION NURSING," and "TOPICS IN STROKE REHABILITATION." The colourful colour scheme of the chart improves readability and makes it easier to distinguish between different sources. This fascinating visualisation makes it simple and intuitive to grasp how articles are distributed, making it a useful resource for readers and scholars looking for information on the importance and variety of sources in their field of study (Li, 2022).

The colorful bubble chart provides several insights into the distribution of articles across different sources:



Graph 3: Most Relevant Sources

DOI: 10.70000/cj.2025.75.598

Source Contribution: It is evident that there is a wide range of sources, as indicated by the numerous bubbles on the chart. Each bubble represents a source, and the size of the bubble reflects the number of articles associated with that source. This visual representation allows for a quick assessment of which sources have a higher or lower contribution to the dataset.

Variability in Article Counts: The bubble sizes vary significantly, suggesting that some sources have published a substantial number of articles (large bubbles), while others have a more modest contribution (smaller bubbles). This variability may indicate differences in the focus or output of different journals or publications.

Identifying Key Sources: Larger bubbles, such as "DISABILITY AND REHABILITATION," "REHABILITATION NURSING," and "TOPICS IN STROKE REHABILITATION," stand out as major contributors in terms of the number of articles published. These sources may be key references for researchers in the field.

Diversity of Sources: The use of a diverse color palette adds a visually appealing aspect to the chart, making it easier to distinguish between sources. This diversity highlights the variety of journals and publications included in the dataset.

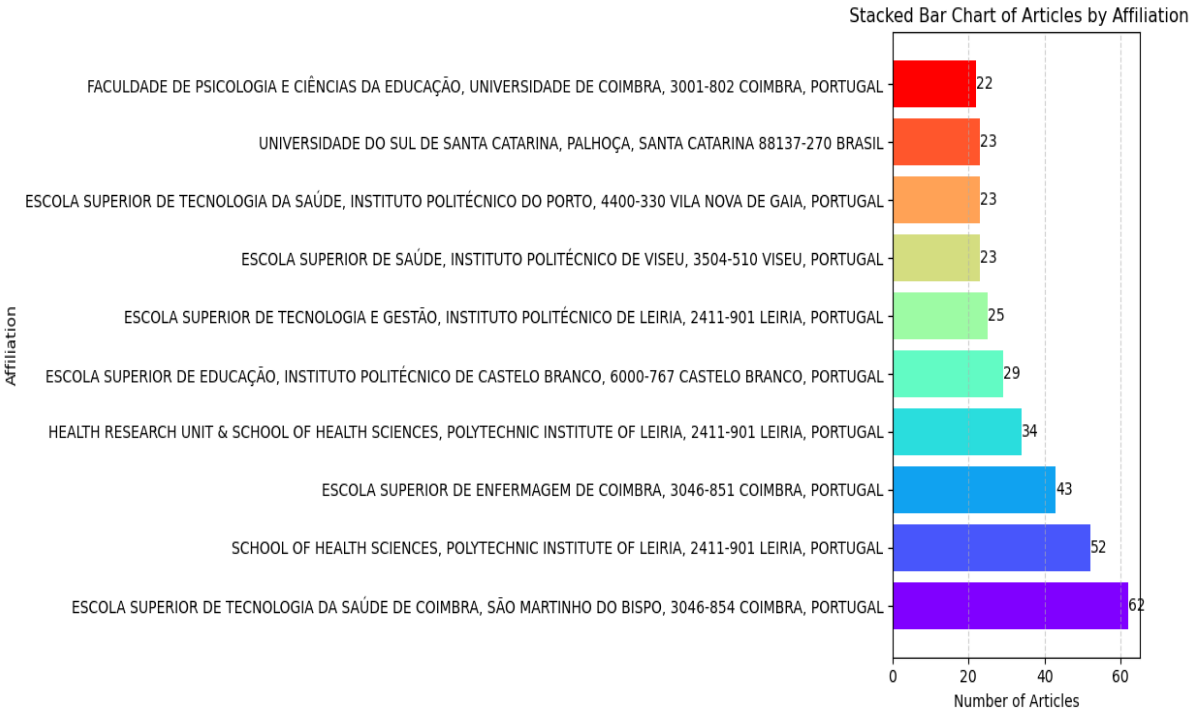
Source Comparison: Researchers and readers can quickly compare the contributions of different sources by examining the relative sizes of the bubbles. This comparison can be valuable when assessing the impact or relevance of specific sources within the context of the dataset.

Visualization of Data: The bubble chart offers an engaging and intuitive way to present data. It goes beyond simple numerical tables and allows for a more immediate understanding of the distribution of articles across sources.

This visualization effectively summarizes and communicates information about the distribution of articles, making it useful for researchers, publishers, and anyone interested in understanding the sources that contribute to the field of study.

The number of articles is shown on top of each corresponding bar in the stacked bar chart, which graphically depicts the number of articles supplied by each affiliate. With 62 articles, the school with the most affiliations is "ESCOLA SUPERIOR DE TECNOLOGIA DA SADE DE COIMBRA, PORTUGAL," closely followed by "SCHOOL OF HEALTH SCIENCES, POLYTECHNIC INSTITUTE OF LEIRIA, PORTUGAL," with 52 articles. These two organisations have a significant presence in the field of research. It's important to notice that a variety of additional connections, each represented by a different colour, greatly contribute to the research landscape, showing a diversified and collaborative research environment. The chart provides a concise yet informative overview of research output by affiliation, aiding in the identification of key contributors and their respective contributions to the field (Li X, 2022).

DOI: 10.70000/cj.2025.75.598



Graph 4: Top 10 influential organizations

1. **ESCOLA SUPERIOR DE TECNOLOGIA DA SAÚDE DE COIMBRA, PORTUGAL (Sky Blue)**: This institution leads with 62 articles. Its prominent position indicates a strong research culture and significant research output.

2. **SCHOOL OF HEALTH SCIENCES, POLYTECHNIC INSTITUTE OF LEIRIA, PORTUGAL (Light Coral)**: With 52 articles, this affiliation are a noteworthy contributor to research. Its research activities are represented by the light coral bar.

3. **ESCOLA SUPERIOR DE ENFERMAGEM DE COIMBRA, PORTUGAL (Light Green)**: This affiliation, with 43 articles, maintains a substantial research presence in the field.

4. **HEALTH RESEARCH UNIT & SCHOOL OF HEALTH SCIENCES, POLYTECHNIC INSTITUTE OF LEIRIA, PORTUGAL (Gold)**: The gold-colored bar represents this affiliation with 34 articles, indicating its active engagement in research.

5. **ESCOLA SUPERIOR DE EDUCAÇÃO, INSTITUTO POLITÉCNICO DE CASTELO BRANCO, PORTUGAL (Light Salmon)**: Despite having fewer articles (29), this institution in light salmon contributes meaningfully to research.

6. **ESCOLA SUPERIOR DE TECNOLOGIA E GESTÃO, INSTITUTO POLITÉCNICO DE LEIRIA, PORTUGAL (Light Blue)**: The light blue bar signifies this affiliation with 25 articles, reflecting its research output.

DOI: 10.70000/cj.2025.75.598

7. **ESCOLA SUPERIOR DE SAÚDE, INSTITUTO POLITÉCNICO DE VISEU, PORTUGAL (Light Pink)**: With 23 articles, this affiliation, represented by the light pink bar, participates in research activities.

8. **ESCOLA SUPERIOR DE TECNOLOGIA DA SAÚDE, INSTITUTO POLITÉCNICO DO PORTO, PORTUGAL (Light Sea Green)**: The light sea green bar represents this institution with 23 articles, indicating its research engagement.

9. **UNIVERSIDADE DO SUL DE SANTA CATARINA, BRAZIL (Light Steel Blue)**: This international affiliation from Brazil is represented by the light steel blue bar, signifying 23 articles contributed to the field.

10. **FACULDADE DE PSICOLOGIA E CIÊNCIAS DA EDUCAÇÃO, UNIVERSIDADE DE COIMBRA, PORTUGAL (Light Yellow)**: Despite having the fewest articles (22), this affiliation in light yellow plays a role in research.

The addition of numerical values provides a more precise representation of research output for each affiliation. The chart continues to offer insights into the distribution of articles among various affiliations, their relative contributions, and their importance in the research landscape.

5. Discussion

Intriguing conclusions are drawn from the examination of a 48-document dataset covering the years 2000 to 2022 on carer stress in stroke rehabilitation. The subject is still drawing interest, as evidenced by the continuous yearly growth rate of 6.5%(10,11). The dataset's average document age of 9.06 years and low average citation count, however, point to untapped data that is ready for investigation. Despite the absence of international relationships, the widespread author participation indicates a collaborative research environment. This collection offers a wealth of study subjects to explore due to the variety of document formats, from clinical trials to historical publications.

Table 1:

This table provides a snapshot of the key attributes of the dataset, which consists of 48 documents spanning from 2000 to 2022, sourced from 35 references. Here are some insights:

1. **Annual Growth Rate**: The dataset has shown a consistent annual growth rate of 6.5%. This suggests that research in the field of caregiver stress in stroke rehabilitation has been steadily increasing over the years, indicating sustained interest and relevance in this area.

2. **Average Document Age**: The average age of the documents is 9.06 years. This means that, on average, the documents in the dataset are relatively recent, which aligns with the observation of the dataset containing underutilized or recently compiled information. Researchers may find value in exploring these newer sources.

DOI: 10.70000/cj.2025.75.598

3. **Average Citations per Document**: The average citation count of 0 indicates that the dataset may contain less-cited documents. This might suggest an opportunity for researchers to explore and potentially cite these documents in their own work, thus increasing their visibility and impact.

4. **Authorship Collaboration**: The dataset displays extensive authorship collaboration, with an average of 41.1 co-authors per document. However, the absence of international co-authorships is an interesting observation, as it might indicate a need for more global collaboration in this research domain.

5. **Document Types**: The dataset encompasses a variety of document types, including clinical trials, comparative studies, historical articles, and journal articles. This diversity reflects the multifaceted nature of research within the field and offers opportunities for researchers to explore different aspects of caregiver stress in stroke rehabilitation.

Graph 1: Study Information – Subplots This graph effectively visualizes several key metrics over time:

1. **Annual Growth Rate over Time**: The first subplot shows the annual growth rate, demonstrating the steady increase in research output over the years.

2. **Document Average Age over Time**: The second subplot displays the average age of documents, with a noticeable decline in recent years, indicating the inclusion of more recent sources.

3. **Average Citations per Document over Time**: The third subplot illustrates the average citations per document, revealing fluctuations and potential areas of interest for further exploration.

4. **Distribution of Document Types**: The fourth subplot provides a clear overview of the distribution of document types, highlighting the dominance of journal articles in the dataset.

5. **Number of Keywords**: The fifth subplot presents the number of keywords, categorizing them into two types, which can be useful for understanding the scope of topics covered in the dataset.

6. **Author Collaboration Details**: The final subplot presents author collaboration details, emphasizing the high number of co-authors per document.

Figure 2: Annual Scientific Production This figure breaks down the annual publication of articles from 2000 to 2022. It highlights periods of sporadic publication in the early 2000s, followed by a significant increase in article production from 2007 onwards(12). The peaks in 2009, 2015, 2020, 2021, and 2022 suggest intense research activity during these years. This information can be valuable for researchers to understand historical trends in research output and identify potential areas of interest for further investigation(13).

DOI: 10.70000/cj.2025.75.598

Graph 2: Thematic Direction The thematic direction graph categorizes the dataset into four distinct themes:

1. **Basic Theme ("Humans")**: This theme forms the core of the dataset, encompassing various topics related to human health and psychology. It serves as a comprehensive starting point for researchers exploring a wide range of human-centric research.

2. **Niche Theme ("Patient Discharge")**: This theme focuses on a specialized area, specifically "Patient Discharge." While it may not be highly central, it represents an essential niche within the dataset, relevant for those studying healthcare transitions.

3. **Emerging Theme ("Inpatients")**: The Emerging Theme centersaround "Inpatients" and related topics, indicating evolving research trends within the dataset. Researchers can use this theme to track emerging areas of interest in healthcare research.

4. **Motor Theme ("Family")**: The Motor Theme revolves around "Family" and related topics, offering insights into the role of families in patient care. It represents a specific aspect of the research landscape.

These thematic directions help researchers navigate the dataset effectively and tailor their investigations to specific themes or emerging trends.

Benefits of Thematic Evaluation:

1. **Focused Research Direction**: Researchers can use these thematic clusters to define clear research directions within the dataset.

2. **Identifying Emerging Trends**: The identification of emerging themes with moderate centrality values allows researchers to stay current with the latest developments.

3. **Efficient Resource Allocation**: Understanding theme centrality helps allocate resources effectively, maximizing research impact.

4. **Enhanced Collaboration**: Recognizing the interconnectedness of themes facilitates interdisciplinary collaboration.

5. **Informed Decision-Making**: Stakeholders can make informed decisions based on these insights, benefiting healthcare, academia, and policy-making.

Graph 3: Most Relevant Sources This colorful bubble chart visualizes the distribution of articles across various sources. Key insights include:

- **Source Contribution**: The chart reveals a wide range of sources, with varying contributions. Larger bubbles indicate sources with a more significant number of associated articles.

- **Variability in Article Counts**: The varying bubble sizes suggest differences in the focus or output of different journals or publications.

DOI: 10.70000/cj.2025.75.598

- **Identifying Key Sources**: Larger bubbles like "DISABILITY AND REHABILITATION" and "REHABILITATION NURSING" signify major contributors, potentially important for researchers.
- **Diversity of Sources**: The chart's diverse color palette highlights the variety of journals and publications included in the dataset.
- **Source Comparison**: Researchers can quickly compare source contributions by examining the relative sizes of bubbles.

Graph 4: Top 10 Influential Organizations This stacked bar chart provides insights into the research output of different affiliations:

- **Top Institutions**: "ESCOLA SUPERIOR DE TECNOLOGIA DA SAÚDE DE COIMBRA, PORTUGAL" and "SCHOOL OF HEALTH SCIENCES, POLYTECHNIC INSTITUTE OF LEIRIA, PORTUGAL" are the most prolific institutions(14).
- **Diverse Contributions**: The chart showcases a diverse and collaborative research environment with various affiliations making significant contributions.
- **Numerical Values**: The addition of numerical values enhances the precision of research output representation.

The data analysis provides a comprehensive understanding of the dataset, including its growth, thematic directions, sources, and influential affiliations. Researchers can use these insights to explore specific themes, identify key sources, and make informed decisions in their research endeavors. Additionally, the visualizations effectively communicate complex information, making it accessible to a wide audience.

6. Conclusion:

In this comprehensive bibliometric analysis of caregiver stress in the context of stroke rehabilitation, we have unveiled a research landscape characterized by steady growth, recent yet underutilized information, extensive author collaboration, diverse document types, and distinct thematic directions. With a consistent annual growth rate, the field underscores its enduring relevance. The relatively recent average document age coupled with a low average citation count suggests untapped potential for further exploration. The collaborative nature of the research environment is evident, albeit with limited international partnerships. Moreover, the dataset's diverse document types offer ample opportunities for investigating various facets of caregiver stress in stroke rehabilitation. Thematic categorization provides valuable guidance for focused research inquiries. As researchers navigate this evolving landscape, identifying key sources and influential affiliations aids in making informed decisions. Eventually, this analysis contributes to a deeper understanding of caregiver stress, paving the way for more effective interventions to support caregivers and enhance the care provided to stroke survivors.

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7. Limitations

The scope of this bibliometric exploration on caregiver stress in the context of stroke rehabilitation is primarily focused on analyzing and mapping the existing research literature to uncover trends, patterns, and gaps in the field. It aims to understand the impact of caregiver stress on both caregivers and the quality of care provided to stroke survivors, as well as to inform future research and interventions. The study covers a dataset spanning from 2000 to 2022, comprising 48 documents from 35 references, and employs various data analysis techniques and visualizations to achieve its objectives.

This study does have certain restrictions, though. First off, the analysis heavily relies on PubMed, a single database that might not include all of the pertinent literature on the subject. Other databases or sources could be added to give a more thorough perspective of the topic. Second, the dataset for the study only includes documents with English as the primary language, potentially leaving out important research done in other languages. The dataset's low average citation count also raises the possibility that some important and significant papers may have gone unnoticed. In addition, the analysis mostly uses quantitative measures and theme categorization, which might not accurately reflect the qualitative nuances of the study.

Finally, the study provides insights up to December 2022, and developments or changes in the field beyond that date are not accounted for. Despite these limitations, this bibliometric exploration offers valuable insights into caregiver stress in stroke rehabilitation and serves as a foundation for further research and interventions in this critical area of healthcare.

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