

**SCOPING REVIEW**

# Recent Trends and Hotspots in Hip Arthroplasty: A Bibliometric Analysis and Visualization Study of Last Five-Year Publications

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**Abstract**

**Objectives:** Bibliometric analysis is one of the most prevalent methods for analyzing and predicting research trends of particular subjects. Through a bibliometric analysis, the present study sought to look into and depict the hotspots and research trends in hip arthroplasty research over the previous five years.

**Methods:** The Web of Science Core Collection database was used to find studies on hip arthroplasty published between 2018 and 2022. The VOS viewer, Cite Space, and Bibliometrix were used to carry out the bibliometric study and network visualization.

**Results:** During the last five years, 5,708 hip arthroplasty publications were cited 40,765 times. The United States and the Journal of Arthroplasty were the top countries and journals regarding the number of studies, respectively. The top 10 global high-impact documents were determined using the citation ranking and citation burst. The most frequently referenced research revealed the epidemiological aspects of hip arthroplasty, perioperative care after hip arthroplasty, COVID-19, periprosthetic joint infections, opioid medicines, stability, and osteonecrosis were the hot topics in hip arthroplasty research. Keyword burst analysis showed that the research trends in hip arthroplasty through 2022 were patient-reported outcome measures (PROM), depression, racial disparity, and artificial intelligence (AI). The analysis of the subject areas revealed the close connections and relationships between different subject areas, as demonstrated by the figures.

**Conclusion:** The hip arthroplasty research community is very productive and highly centralized. Periprosthetic joint infection, dual-mobility cups, spinopelvic mobility, direct anterior approach, outpatient total hip arthroplasty, polyethylene, periprosthetic fracture, acetabular defects, tranexamic acid, developmental dysplasia of the hip, and safety-net hospitals were recent trends in hip arthroplasty research. Patient-reported outcome measures, depression, racial disparities, and AI were research hotspots in hip arthroplasty.

**Level of evidence: IV**

**Keywords:** Bibliometric analysis, Hip arthroplasty, Hip replacement, Trends, Visualization

**Introduction**

We are fortunate to live in a globalized period when researchers and institutions worldwide contribute to developing hip arthroplasty literature.<sup>1,2</sup> It is widely known that the researchers and clinicians who work in the field of hip arthroplasty are among the most productive in the world.<sup>3</sup> It is also crucial for physicians,

health commissioners, and governments<sup>4</sup> to have an evidence-based practice tailored to the requirements of their patients. Therefore, it is helpful to know the trends and hot topics in total hip arthroplasty (THA) to improve the daily practice based on the new evidence and to direct further research in this field.

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Bibliometric analysis is among the most common approaches to analyzing and anticipating specific research trends due to its widespread recognition as an alternative method to evaluate academically complex topics in library and information science.<sup>5</sup> Every five years, the ophthalmology research community conducts a bibliometric analysis.<sup>6-8</sup> However, the present study is the first to provide a concise overview of THA literature, pointing the way for future scholars by giving a basis of references and potential research areas. In this study, we drew social network diagrams by analyzing the publications, trends, research collaborations, and citation patterns. We can predict where arthroplasty research will be most productive in the future based on keyword clusters.

The main goals of this research include using bibliometric analysis to investigate the following questions: 1) which countries, institutions, and authors contributed to the hip arthroplasty literature, and how have the output and scholarly impacts of those participants evolved over the five years between 2018 and 2022) How have collaborations between countries and authors evolved in the last five years? 3) What are the hot topics in hip arthroplasty literature, and how have they affected them in the last five years?

## Materials and Methods

### Data Sources

The Web of Science Core Collection (WoSCC) was used to collect the data used in this study. The search strategy was "hip arthroplasty" OR "hip replacement" as the topic. Studies published within the last five years, document type of article, WoS category of orthopaedics, and English language were included. Data was collected on 31 December 2022.

### Data Collection and Processing

Relevant data from the WoSCC were retrieved to describe the number of papers published per year, the number of countries' publications, and the number of journal publications in the field of hip arthroplasty. All hip arthroplasty-related articles, including references, were exported as plain text for country collaboration analysis, keyword co-occurrence analysis, and keyword burst analysis.

### Statistical and Bibliometric Analysis

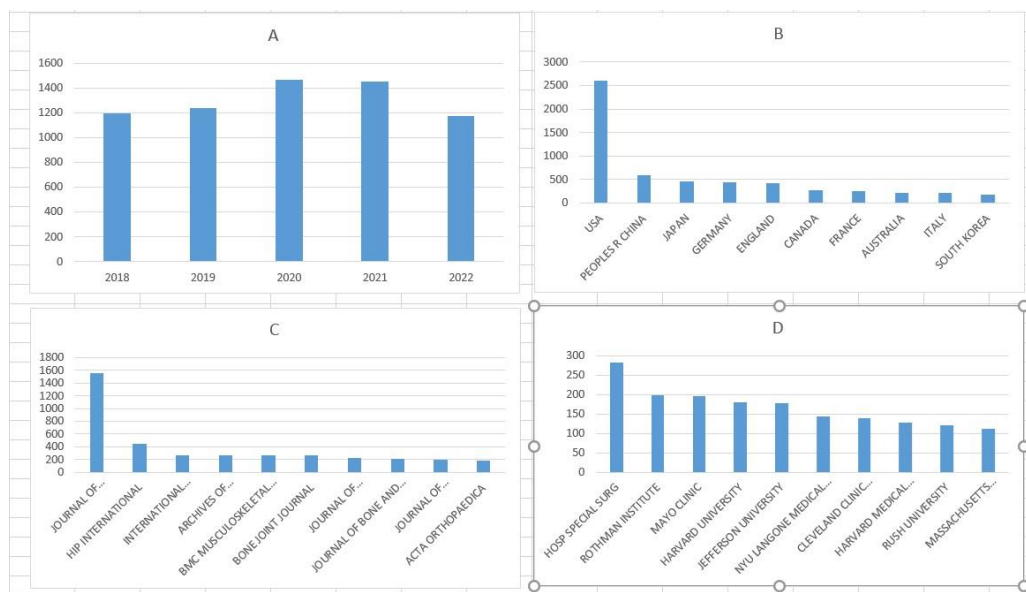
Bibliometric analysis was carried out using Cite Space

version 6.1.R6 (Drexel University, Philadelphia, PA, USA),<sup>9</sup> VOS viewer version 1.6.18 (Leiden University, The Netherlands),<sup>10</sup> and Bibliometric version 4.0 (a package in R; University of Naples Federico, Italy).<sup>11</sup> The keyword burst analysis was used to determine temporal trends in keywords related to hip arthroplasty.<sup>12</sup> The most recent burst keywords were identified as research frontier issues, implying that future breakthroughs in these areas are possible. To determine subject collaborations, the co-occurrence of subject categories was investigated. The number of occurrences of a subject category was used to weigh the data. The larger it was, the more examples there were in a subject group. Subject category temporal rings, the thickness indicated the number of subject category occurrences in the subsequent year, were used to demonstrate temporal patterns in subject category occurrences. The connecting line between subject areas symbolised interdisciplinary collaboration. The larger the connecting line, the stronger the collaboration.

## Results

### Global Research Output Distribution

There were 5,708 articles published in 79 countries concerning hip arthroplasty research. These articles were cited 40,765 times. Every year, approximately 1,100 studies are published [Figure 1A]. The analysis of countries revealed that the United States had the most publications—four times more than China, which came in second, and then Germany and Japan, which came in third and fourth, respectively [Figure 1B]. Within the last five years, there has been a publication burst on hip arthroplasty in Sweden, Finland, the Czech Republic, and Poland [Figure 2]. Collaborations between countries are represented by red lines, with the diameter of the lines proportional to the number of collaborations between countries [Figure 3]. Eighty-two journals published articles on hip arthroplasty research. The Journal of Arthroplasty (JOA; n=1,560, 27%), Hip International (n=445, 8%), and International Orthopaedics (n=273, 5%) published most articles [Figure 1C]. Regarding research institutions, the Hospital for Special Surgery ranked first, with 262 articles [Figure 1D].



**Figure 1. Global Research Output Distribution: (A) publication number per year, (B) top 10-publication number per country, (C) top 10-publication number per journal, (D) top 10-publication number per institution**

**Top 4 Countries with the Strongest Citation Bursts**

| Countries      | Year | Strength | Begin | End  | 2018 - 2022 |
|----------------|------|----------|-------|------|-------------|
| SWEDEN         | 2018 | 2.09     | 2019  | 2019 |             |
| FINLAND        | 2018 | 2.04     | 2019  | 2019 |             |
| CZECH REPUBLIC | 2020 | 2.22     | 2021  | 2022 |             |
| POLAND         | 2018 | 1.87     | 2021  | 2022 |             |

Figure 2. Countries with citation burst in last 5-year

Country Collaboration Map

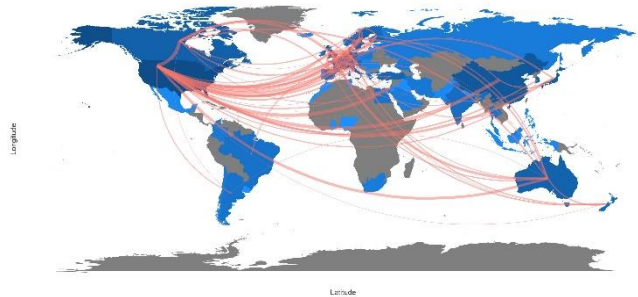


Figure 3. Between countries collaborations

**Authors**

In the last five years, 16,162 authors published articles on hip arthroplasty. Schwarzkopf R had the most publications (67), and Mont MA had the most citations (1,054) in hip arthroplasty [Table 1; Figure 4A]. The analysis of co-

authorship in hip arthroplasty are detailed in [Figure 4B]. An author's minimum number of citations was set at 160, and his or her minimum number of publications was set at 20. The size of the nodes scales with authors' citation.

| Table 1. Authors with highest citations and publications |           |             |         |         |
|--|-----------|-------------|---------|---------|
| Author   | Citations | Publication | h-Index | g-Index |
| Mont MA  | 1054      | 72          | 20      | 29      |
| Parvizi J  | 1037      | 73          | 19      | 30      |
| Domb BG  | 955       | 62          | 18      | 28      |
| Abdel MP   | 892       | 85          | 19      | 26      |
| Schwarzkopf R  | 829       | 102         | 14      | 25      |
| Della Valle CJ   | 825       | 46          | 16      | 28      |
| Berry DJ   | 771       | 62          | 16      | 26      |
| Premkumar A  | 743       | 12          | 6       | 12      |
| Sloan M  | 705       | 8           | 5       | 8       |
| Sheth NP   | 702       | 11          | 7       | 11      |

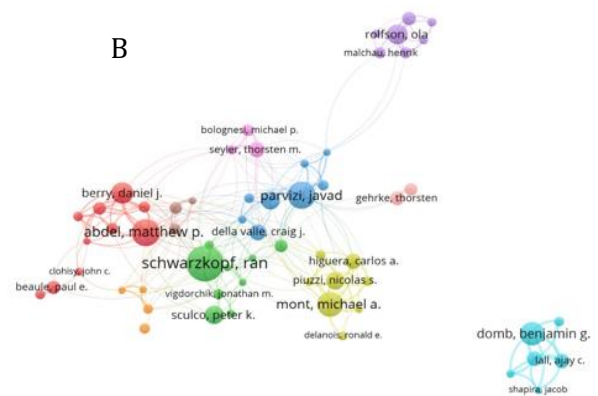
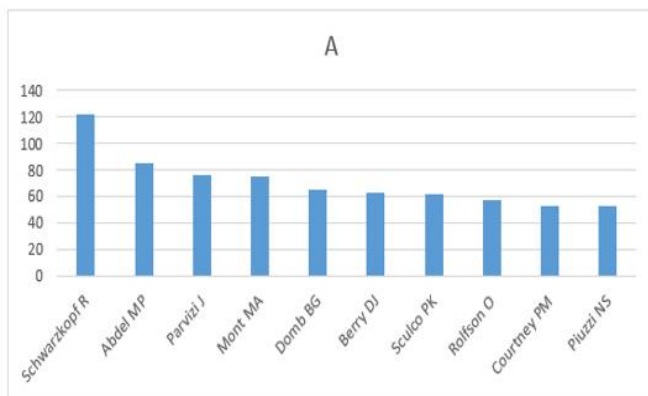


Figure 4. (A): Top-10-publication number per author, (B): Co-authorship relationships

**Most Influential Papers**

The current study identified the top 10 references with the highest number of citation bursts in hip arthroplasty, which assists researchers in locating topics of particular interest in

the history of scholarly publications [Figure 5, Table 2]. Documents with the most citations per year are detailed in [Table 3].

**Top 10 References with the Strongest Citation Bursts**

| References  | Year | Strength | Begin | End  | 2018 - 2022 |
|---|------|----------|-------|------|-------------|
| Kurtz SM, 2014, J BONE JOINT SURG AM, V96A, P624, DOI 10.2106/JBJS.M.00285,           | 2014 | 14.3     | 2018  | 2019 |             |
| Osmon DR, 2013, CLIN INFECT DIS, V56, P0, DOI 10.1093/cid/cis803, 10.1093/cid/cis966, | 2013 | 9.79     | 2018  | 2018 |             |
| Parvizi J, 2014, J ARTHROPLASTY, V29, P1331, DOI 10.1016/j.arth.2014.03.009,          | 2014 | 9.21     | 2018  | 2019 |             |
| Plummer DR, 2016, J ARTHROPLASTY, V31, P264, DOI 10.1016/j.arth.2015.07.039,          | 2016 | 7.83     | 2018  | 2018 |             |
| Zmistowski B, 2013, J BONE JOINT SURG AM, V95A, P1869, DOI 10.2106/JBJS.L.00679,      | 2013 | 7.83     | 2018  | 2018 |             |
| Kremers HM, 2015, J BONE JOINT SURG AM, V97A, P1386, DOI 10.2106/JBJS.N.01141,        | 2015 | 9.76     | 2019  | 2020 |             |
| Esposito CI, 2015, J ARTHROPLASTY, V30, P109, DOI 10.1016/j.arth.2014.07.009,         | 2015 | 7.75     | 2019  | 2020 |             |
| Sloan M, 2018, J BONE JOINT SURG AM, V100, P1455, DOI 10.2106/JBJS.17.01617,          | 2018 | 11.21    | 2021  | 2022 |             |
| Schwartz AM, 2020, J ARTHROPLASTY, V35, PS79, DOI 10.1016/j.arth.2020.02.030,         | 2020 | 10.75    | 2021  | 2022 |             |
| Parvizi J, 2018, J ARTHROPLASTY, V33, P1309, DOI 10.1016/j.arth.2018.02.078,          | 2018 | 7.78     | 2021  | 2022 |             |

**Figure 5. Publications with strongest citation burst****Table 2. Articles with Highest Citation Burst from 2018 to 2022**

| #  | Title  |
|----|--|
| 1  | Impact of the Economic Downturn on Total Joint Replacement Demand in the United States <sup>1</sup>  |
| 2  | Diagnosis and Management of Prosthetic Joint Infection: Clinical Practice Guidelines by the Infectious Diseases Society of America <sup>2</sup>                          |
| 3  | Definition of Periprosthetic Joint Infection <sup>3</sup>  |
| 4  | Diagnosis and Management of Adverse Local Tissue Reactions Secondary to Corrosion at the Head-Neck Junction in Patients with Metal on Polyethylene Bearings <sup>4</sup> |
| 5  | Unplanned Readmission After Total Joint Arthroplasty: Rates, Reasons, and Risk Factors <sup>5</sup>  |
| 6  | Prevalence of Total Hip and Knee Replacement in the United States <sup>6</sup>   |
| 7  | Cup Position Alone Does Not Predict Risk of Dislocation After Hip Arthroplasty <sup>7</sup>  |
| 8  | Projected Volume of Primary Total Joint Arthroplasty in the U.S., 2014 to 2030 <sup>8</sup>  |
| 9  | Projections and Epidemiology of Revision Hip and Knee Arthroplasty in the United States to 2030 <sup>9</sup>   |
| 10 | The 2018 Definition of Periprosthetic Hip and Knee Infection: An Evidence-Based and Validated Criteria <sup>10</sup>   |

1. Kurtz SM, Ong KL, Lau E, Bozic KJ. Impact of the economic downturn on total joint replacement demand in the United States: updated projections to 2021. *J Bone Joint Surg Am.* Apr 16 2014; 96(8):624-30. doi:10.2106/jbjs.M.00285

2. Osmon DR, Berbari EF, Berendt AR, et al. Diagnosis and management of prosthetic joint infection: clinical practice guidelines by the Infectious Diseases Society of America. *Clin Infect Dis.* Jan 2013; 56(1):e1-e25. doi:10.1093/cid/cis803

3. Parvizi J, Zmistowski B, Berbari EF, et al. New definition for periprosthetic joint infection: from the Workgroup of the Musculoskeletal Infection Society. *Clin Orthop Relat Res.* 2011; 469(11):2992-2994. doi: 10.1007/s11999-011-2102-9

4. Plummer DR, Berger RA, Paprosky WG, Sporer SM, Jacobs JJ, Della Valle CJ. Diagnosis and Management of Adverse Local Tissue Reactions Secondary to Corrosion at the Head-Neck Junction in Patients with Metal on Polyethylene Bearings. *J Arthroplasty.* Jan 2016; 31(1):264-8. doi:10.1016/j.arth.2015.07.039

5. Zmistowski B, Restrepo C, Hess J, Adibi D, Cangoz S, Parvizi J. Unplanned readmission after total joint arthroplasty: rates, reasons, and risk factors. *J Bone Joint Surg Am.* Oct 16 2013; 95(20):1869-76. doi:10.2106/jbjs.L.00679

6. Maradit Kremers H, Larson DR, Crowson CS, et al. Prevalence of Total Hip and Knee Replacement in the United States. *The Journal of bone and joint surgery American volume.* 2015; 97(17):1386-1397. doi:10.2106/JBJS.N.01141

7. Esposito CI, Gladnick BP, Lee YY, et al. Cup position alone does not predict risk of dislocation after hip arthroplasty. *J Arthroplasty.* Jan 2015; 30(1):109-13. doi:10.1016/j.arth.2014.07.009

8. Sloan M, Premkumar A, Sheth NP. Projected Volume of Primary Total Joint Arthroplasty in the U.S., 2014 to 2030. *J Bone Joint Surg Am.* Sep 5 2018; 100(17):1455-1460. doi:10.2106/jbjs.17.01617

9. Schwartz AM, Farley KX, Guild GN, Bradbury TL, Jr. Projections and Epidemiology of Revision Hip and Knee Arthroplasty in the United States to 2030. *J Arthroplasty.* Jun 2020; 35(6s):S79-S85. doi:10.1016/j.arth.2020.02.030

10. Parvizi J, Tan TL, Goswami K, et al. The 2018 Definition of Periprosthetic Hip and Knee Infection: An Evidence-Based and Validated Criteria. *J Arthroplasty.* May 2018; 33(5):1309-1314.e2. doi:10.1016/j.arth.2018.02.078

Table 3. Articles with Highest Citation per Year from 2018 to 2022

| First author, Year, Journal               | Title  | Total Citations | Citation per Year |
|---|--|-----------------|-------------------|
| Sloan N, 2018, j bone joint surg am       | Projected Volume of Primary Total Joint Arthroplasty in the U.S., 2014 to 2030 <sup>1</sup>  | 633             | 126.60            |
| Wainwright TW, 2020, acta orthop          | Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations <sup>2</sup> | 149             | 49.67             |
| Schwartz AM, 2020, j arthroplasty         | Projections and Epidemiology of Revision Hip and Knee Arthroplasty in the United States to 2030 <sup>3</sup>   | 128             | 42.67             |
| Hirschmann MT, 2020, knee surg sport tr a | COVID-19 coronavirus: recommended personal protective equipment for the orthopaedic and trauma surgeon <sup>4</sup>  | 110             | 36.67             |
| Ackerman IN, 2019, bmc musculoskel dis    | The projected burden of primary total knee and hip replacement for osteoarthritis in Australia to the year 2030 <sup>5</sup>   | 146             | 36.50             |
| Premkumar A, 2021, j arthroplasty         | Projected Economic Burden of Periprosthetic Joint Infection of the Hip and Knee in the United States <sup>6</sup>  | 66              | 33.00             |
| Sabatino MJ, 2018, j bone joint surg am   | Excess Opioid Medication and Variation in Prescribing Patterns Following Common Orthopaedic Procedures <sup>7</sup>  | 159             | 31.80             |
| Tezuka T, 2019, j arthroplasty            | Functional Safe Zone Is Superior to the Lewinnek Safe Zone for Total Hip Arthroplasty: Why the Lewinnek Safe Zone Is Not Always Predictive of Stability <sup>8</sup>                 | 111             | 27.75             |
| Kurtz SM, 2018, j arthroplasty            | Are We Winning or Losing the Battle with Periprosthetic Joint Infection: Trends in Periprosthetic Joint Infection and Mortality Risk for the Medicare Population <sup>9</sup>        | 138             | 27.60             |
| Voon BH, 2020, j arthroplasty             | The 2019 Revised Version of Association Research Circulation Osseous Staging System of Osteonecrosis of the Femoral Head <sup>10</sup>   | 74              | 24.67             |

1. Sloan M, Premkumar A, Sheth NP. Projected Volume of Primary Total Joint Arthroplasty in the U.S., 2014 to 2030. J Bone Joint Surg Am. Sep 5 2018; 100(17):1455-1460. doi:10.2106/jbjs.17.01617

2. Wainwright TW, Gill M, McDonald DA, et al. Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations. Acta Orthop. Feb 2020; 91(1):3-19. doi:10.1080/17453674.2019.1683790

3. Schwartz AM, Farley KX, Guild GN, Bradbury TL, Jr. Projections and Epidemiology of Revision Hip and Knee Arthroplasty in the United States to 2030. J Arthroplasty. Jun 2020; 35(6s):S79-S85. doi:10.1016/j.arth.2020.02.030

4. Hirschmann MT, Hart A, Henckel J, Sadoghi P, Seil R, Mouton C. COVID-19 coronavirus: recommended personal protective equipment for the orthopaedic and trauma surgeon. Knee Surg Sports Traumatol Arthrosc. Jun 2020; 28(6):1690-1698. doi: 10.1007/s00167-020-06022-4

5. Ackerman IN, Bohensky MA, Zomer E, et al. The projected burden of primary total knee and hip replacement for osteoarthritis in Australia to the year 2030. BMC Musculoskeletal Disord. Feb 23 2019; 20(1):90. doi: 10.1186/s12891-019-2411-9

6. Premkumar A, Kolin DA, Farley KX, et al. Projected Economic Burden of Periprosthetic Joint Infection of the Hip and Knee in the United States. J Arthroplasty. May 2021; 36(5):1484-1489.e3. doi:10.1016/j.arth.2020.12.005

7. Sabatino MJ, Kunkel ST, Ramkumar DB, Keeney BJ, Jevsevar DS. Excess Opioid Medication and Variation in Prescribing Patterns Following Common Orthopaedic Procedures. J Bone Joint Surg Am. Feb 7 2018; 100(3):180-188. doi:10.2106/jbjs.17.00672

8. Tezuka T, Heckmann ND, Bodner RJ, Dorr LD. Functional Safe Zone Is Superior to the Lewinnek Safe Zone for Total Hip Arthroplasty: Why the Lewinnek Safe Zone Is Not Always Predictive of Stability. J Arthroplasty. Jan 2019; 34(1):3-8. doi:10.1016/j.arth.2018.10.034

9. Kurtz SM, Lau EC, Son MS, Chang ET, Zimmerli W, Parvizi J. Are We Winning or Losing the Battle With Periprosthetic Joint Infection: Trends in Periprosthetic Joint Infection and Mortality Risk for the Medicare Population. J Arthroplasty. Oct 2018; 33(10):3238-3245. doi:10.1016/j.arth.2018.05.042

10. Yoon BH, Mont MA, Koo KH, et al. The 2019 Revised Version of Association Research Circulation Osseous Staging System of Osteonecrosis of the Femoral Head. J Arthroplasty. Apr 2020; 35(4):933-940. doi:10.1016/j.arth.2019.11.029

### Research Hotspots

The co-citation correlation and cluster network map were created in this study using 17,890 references from 5,708 articles (duplicates were left out). The title's clustered network of hip arthroplasty is detailed in [Figure 6]. The co-

cited references were divided into 17 major clusters based on their titles. The timeline view of the cluster map, which aids in identifying emerging foci in hip arthroplasty, is detailed in figure 7; each node represents a significant study [Figure 7]. The number of nodes is related to the number of citations for that study.

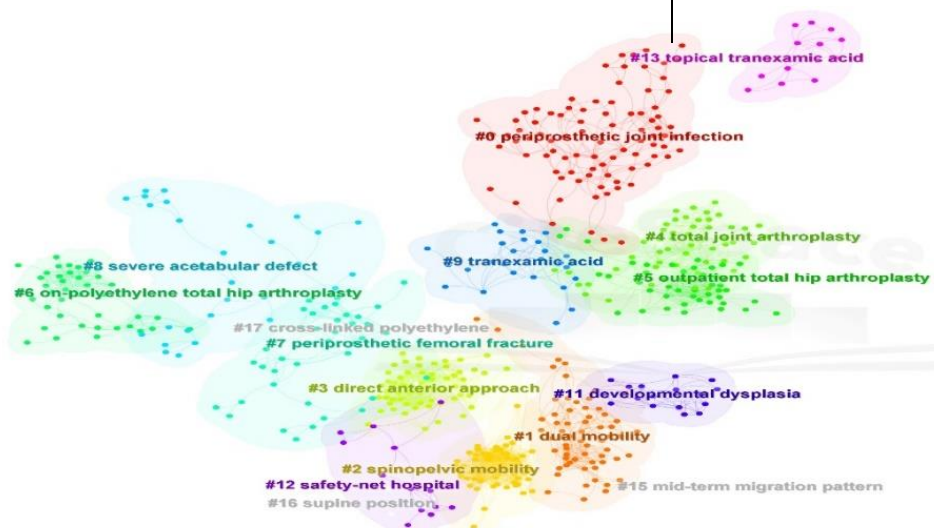


Figure 6. Network view of co-cited references clustered by title

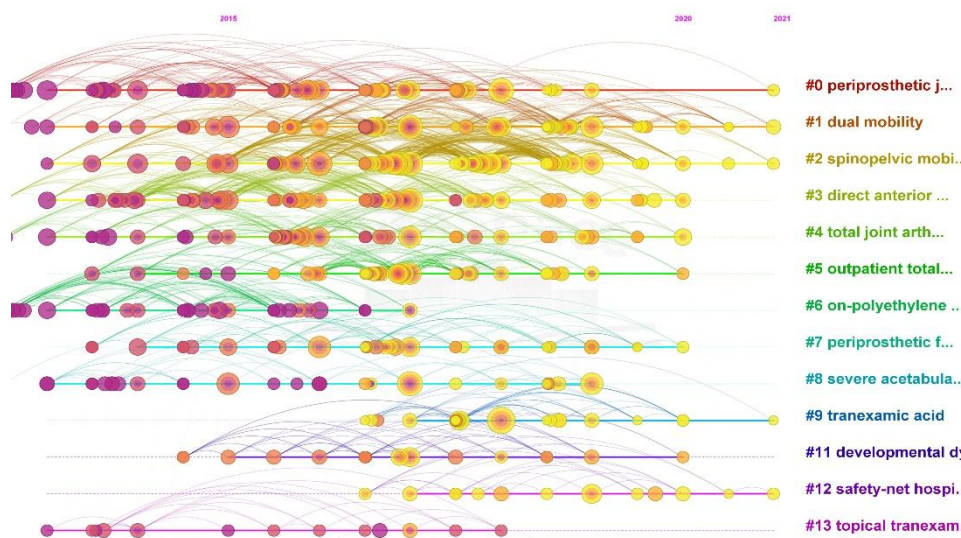


Figure 7. Timeline view of co-cited references clustered by title

**Burst Detection with Keywords**

We have identified the top 30 keyword bursts from 2018 to 2022 based on an analysis of 5,708 articles [Figure 8]. A red

line from the beginning to the end year represented the period of a citation burst.

**Top 30 Keywords with the Strongest Citation Bursts**

| Keywords                             | Year | Strength | Begin | End  | 2017 - 2022 |
|--------------------------------------|------|----------|-------|------|-------------|
| conventional polyethylene            | 2018 | 7.42     | 2018  | 2018 | █           |
| controlled trial                     | 2018 | 6.5      | 2018  | 2018 | █           |
| junction                             | 2018 | 5.57     | 2018  | 2018 | █           |
| randomized controlled trial          | 2018 | 5.17     | 2018  | 2018 | █           |
| total kneearthroplasty               | 2018 | 5.12     | 2018  | 2018 | █           |
| mechanical property                  | 2018 | 4.91     | 2018  | 2019 | █           |
| population                           | 2018 | 4.68     | 2018  | 2018 | █           |
| local tissue reaction                | 2018 | 4.67     | 2018  | 2018 | █           |
| in vitro                             | 2018 | 4.42     | 2018  | 2018 | █           |
| metaanalysis                         | 2018 | 4.11     | 2018  | 2018 | █           |
| adverse reaction                     | 2018 | 4.05     | 2018  | 2019 | █           |
| register                             | 2018 | 3.73     | 2018  | 2018 | █           |
| wound complication                   | 2018 | 3.71     | 2018  | 2018 | █           |
| bariatric surgery                    | 2018 | 3.71     | 2018  | 2018 | █           |
| acetabular component position        | 2018 | 3.71     | 2018  | 2018 | █           |
| trial                                | 2018 | 3.56     | 2018  | 2018 | █           |
| retrieval analysis                   | 2018 | 3.55     | 2018  | 2019 | █           |
| arthroscopy                          | 2019 | 3.97     | 2019  | 2020 | █           |
| subtrochanteric shortening osteotomy | 2019 | 3.97     | 2019  | 2020 | █           |
| performance                          | 2018 | 3.55     | 2019  | 2019 | █           |
| increased risk                       | 2019 | 3.52     | 2019  | 2019 | █           |
| expectation                          | 2020 | 4.74     | 2020  | 2020 | █           |
| patient-reported outcome measure     | 2020 | 4.6      | 2020  | 2022 | █           |
| increase                             | 2018 | 4.53     | 2021  | 2022 | █           |
| unicompartmental knee arthroplasty   | 2021 | 4.05     | 2021  | 2022 | █           |
| limb length                          | 2021 | 3.99     | 2021  | 2022 | █           |
| participation                        | 2021 | 3.99     | 2021  | 2022 | █           |
| racial disparity                     | 2021 | 3.99     | 2021  | 2022 | █           |
| artificial intelligence              | 2021 | 3.99     | 2021  | 2022 | █           |
| depression                           | 2021 | 3.99     | 2021  | 2022 | █           |

Figure 8. Keywords with Strongest Citation Burst

## Discussion

In the current study, we employed bibliometric mapping to visualize the results of our analysis of hip arthroplasty literature published between 2018 and 2022. We looked into the history of hip arthroplasty and its possible future directions. The following report includes resources and recommendations for further study.

### Global Research Output Distribution

From 2018 to 2022, there was a slight increase in hip arthroplasty publications. With the most publications on hip arthroplasty, the United States dominated the field. In addition, collaboration studies revealed that the United States has the most collaborations with other nations. Citations for hip arthroplasty have recently increased in Sweden, Finland, the Czech Republic, and Poland. As a result, additional collaborations with these countries may be formed. There were numerous intercontinental collaborations in hip arthroplasty; however, most collaborations were between the United States and European nations. The top 10 institutions were all from the United States, except one from China. Journal of Arthroplasty had the most papers, total citations, and h-index in the field of hip arthroplasty, as well as the most articles and citations. Journal of Arthroplasty policies may have a direct effect on the hip arthroplasty research community. Previous bibliometric evaluations of joint replacements also identified JOA as the most important journal.<sup>13, 14</sup>

### Authors

Nine of the top ten authors were Americans, with one from Sweden. Author collaborations were observed using co-authorship analysis. Numerous collaborations among leading authors indicate that hip arthroplasty literature is highly centralized.

### Most Influential Papers

The top-cited article information is one of the most valuable indicators in the bibliometric approach and is frequently evaluated in orthopaedic-related bibliometric studies. Our research revealed the top ten references with the highest citation bursts, assisting researchers in identifying topics of particular interest in the historical evolution of scholarly publications. The most influential academic papers in the last two years were "Projected Volume of Primary Total Joint Arthroplasty in the US 2030",<sup>15</sup> "Projections and Epidemiology of Revision Joint Arthroplasty in the US to 2030",<sup>16</sup> and "Definition of Periprosthetic Hip and Knee Infection".<sup>17</sup> Highly cited articles were about "Epidemiology of TJA",<sup>15,16,18</sup> "Perioperative Care of TJA",<sup>19</sup> "COVID-19",<sup>20</sup> "Periprosthetic Joint Infection (PJI)",<sup>17,20</sup> "Opioid Medication",<sup>22</sup> "Stability after THA",<sup>23</sup> and "Osteonecrosis".<sup>24</sup>

### Research Hotspots

Based on the co-cited references clustered by title, most of the cited papers in recent hip arthroplasty literature were about (I) "PJI", (II) "dual-mobility", (III) "spinopelvic mobility", (IV) "direct anterior approach (DAA)", (V) "outpatient THA", (VI) "polyethylene", (VII) "periprosthetic fracture", (VIII) "acetabular defect", (IX) "tranexamic acid",

(X) "developmental dysplasia of hip", and (XI) "safety-net hospital".<sup>1</sup>

In recent years, PJI has been a challenging topic, affecting most studies in hip arthroplasty; conducting a practical guideline for detecting PJI before. (II) Some researchers evaluated the long-term outcome of dual mobility cups during the last five years. Dual mobility articulations could be an alternative to traditional bearing surfaces, with low rates of dislocation and reasonable overall survival rates in both primary and revision THAs.<sup>25</sup> (III) Spinopelvic mobility is a recently discovered coordinated biomechanical relationship between acetabular anteversion, pelvic tilt, and lumbar lordosis. This issue affects the outcome of primary and revision THA.<sup>26</sup> (IV) In recent years, the DAA for THA has become more popular, mainly because it is said to cause less pain during surgery, speed up recovery, and improve patient outcomes. Also, industries, hospitals, and surgeons have all done a lot to spread the word about the DAA through marketing and promotion.<sup>27</sup> (V) THA is moving from an inpatient to an outpatient setting. Outpatient THA has good results and low readmission rates in the short term for people with no significant health problems.<sup>28</sup> (VI) In long-term follow-up, recent studies found that highly cross-linked polyethylene liners reduced the incidence of osteolysis, aseptic loosening, and implant revision regardless of fixation type, patient age, and patient activity.<sup>29</sup> (VII) Several commercially available fracture plates have been developed expressly for treating periprosthetic fractures. Several clinical trials, however, continue to show a failure of fixation methods utilized for these fractures.<sup>30</sup> (VIII) Acetabular custom-made implants are a dependable option for pelvic discontinuity and specific situations of bone loss where the faulty feature cannot be addressed with ordinary implants.<sup>31</sup> (IX) Recent research has shown that the intravenous admission of tranexamic acid can minimize transfusion requirements and total blood loss while not increasing the risk of thromboembolic events in patients having hip surgery.<sup>32</sup> (X) THA in dysplasia of the hip (DDH) patients is a complicated procedure due to the wide range of anatomical defects of the acetabulum and femur, along with the younger age of these patients. One of the most critical requirements for a successful THA is comprehensive operation planning with multiple alternatives.<sup>33</sup> (XI) In the US healthcare system, premium THA technologies are increasingly adopted; however, this trend is not mirrored in hospitals serving underserved patient groups. Patients who underwent THA at hospitals with a higher safety net burden had poorer outcomes than those who underwent THA at hospitals with a lower safety net burden.<sup>34, 35</sup>

### Burst Detection with Keywords

Based on the co-occurrence keyword burst detection in hip arthroplasty, the newest research trends were "Patient-Reported Outcome Measure" (PROM), "Racial Disparity", "Artificial Intelligence" (AI), and "Depression". With patients becoming more involved in their care, PROM is used more and more to measure the treatment effects from the patient's point of view.<sup>36, 37</sup> As a result, lately, doctors have focused on

the patients' depression, which could affect the PROM.<sup>38,39</sup> Recent studies have shown differences between people of different races and ethnicities in all parts of THA care, including access to, utilization, and outcomes. Minority patients are more likely to need more intensive rehabilitation and care after surgery.<sup>40</sup> we are entering a new medical era where AI systems can look at complicated algorithms and learn independently. Artificial intelligence can be used in clinical practice through risk assessment models to improve diagnostic accuracy and workflow.<sup>41</sup> in the last few years, there has been a significant rise in the number of projects that use AI to solve problems in arthroplasty.<sup>42, 43</sup> the highest burst strength was about "conventional polyethylene" and "controlled trial". Long-term outcomes of polyethylene type affected the published articles in 2018.<sup>44</sup> most studies that have been conducted on hip replacements have been observational studies. In the past, hip arthroplasty research suffered from a lack of control groups. However, there has been a trend toward publishing controlled trials in recent years.

### Conclusion

This study provided a brief bibliometric analysis of recent hip arthroplasty literature based on the WoSCC database.

Recent trends in hip arthroplasty research were PJI, dual-mobility cups, spinopelvic mobility, DAA, outpatient THA, polyethylene, periprosthetic fracture, acetabular defects, tranexamic acid, DDH, and safety-net hospitals. Research hotspots in hip arthroplasty research were PROM, depression, racial disparity, and AI. This study also showed the hip arthroplasty research community is very productive and highly centralized.

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