

Knee surgery: Trends and the 50 most cited articles

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insight into both the influence and reach of a research article, and such an evaluation can demonstrate the key topics of interest within a specialty. Increased awareness of the impact of the information available to the scientific community has led to several new analyses of the most cited articles in a variety of different fields.²⁻⁴ Specific to orthopedic surgery, to our knowledge, the authors believe this is the first evaluation of the top 50 articles published pertaining to knee surgery exclusively.

Abstract

Knee Surgery is one of the most commonly performed orthopedic procedures, and a rapidly evolving area of research. A bibliographic analysis was conducted to explore the characteristics of the top 50 most cited articles in knee surgery. The Web of Science Core Collection Database was used to search for *Knee AND Surgery*, further refined for orthopedic surgery, yielding 1,660 articles. After inclusion and exclusion criteria were applied, the top 50 cited articles were statistically and thematically analyzed. Year of publication ranged from 1982 to 2014. The highest volume of research came from USA, with the Journal of Bone and Joint Surgery having the highest number of papers in the top 50. The most common theme of research was Knee Arthroplasty Outcomes. Our study elucidates trends and popular areas of research in the field of knee surgery, and provides researchers with an overview of areas to focus, where there is scope for high-impact original research.

Introduction

The turn of the 21st Century heralded the beginning of the fourth industrial revolution. The impact of this has already had a profound effect on healthcare, from its provision, to the exponential basis upon which scientific research has grown and developed. The increase in accessibility has significant ethical and moral implications, which have previously not required analysis and consideration. Study of critical appraisal explores a series of heuristics and biases used to appraise scientific articles including the 'Publication Bias'. This describes the relationship of a study being published in a scientific journal being frequently associated with a statistically significant result.¹ The implications of this have determined the quantity of both the articles published, and the number of times an article is cited by others. The analysis of citations provides an

Materials and Methods

In June 2019, the Web of Science Core Collection Database (Clarivate Analytics) was searched. The initial search terms were 'Knee' with the Boolean string 'AND' and the term 'Surgery'. This search was then further refined using the 'Web of Science Category' Tag of 'Orthopedics'. Results were then ranked by number of citations, before being evaluated for appropriateness and relevance. Inclusion criteria required explicit relevance to surgical intervention. Articles were reviewed by title and abstract by two of the authors, and in the event of a disagreement, a third author would adjudicate. Each article was assessed for authorship, author institution, country of origin, year of publication and name of journal. Each title and abstract were then tagged by subject area to assess which topics received the most discussion.

Results

A total of 1,660 articles were identified, with the top 50 articles related to surgical intervention included in the results (Table 1).⁵⁻⁵⁴ A total of 11 articles were excluded, having not met with the inclusion criteria. The total number of citations ranged from 1,407 to 274, with the most cited article titled: Evaluation of knee ligament surgery results with special emphasis on use of a scoring scale, published in 1982. However, the most recurring theme within the top 50 most cited knee surgery articles pertained to the outcomes of knee arthroplasty (Figure 1). The articles were then assessed for date of publication, with the highest frequency of citations of the top 50 papers occurring in 2007 (n=15) (Figure 2).

Evaluating the papers based on country of origin demonstrated that the United States of America had n=22 of the 50 most cited articles in knee surgery (Figure 3). Furthermore, the Journal of Bone and Joint Surgery had n=16 out of the top 50 most

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cited articles in knee surgery (Table 2). Figure 4 illustrates the top 50 most cited articles in knee surgery by journal.

Discussion

Research forms the basis upon which advances in medicine and surgery are proposed, evaluated, and disseminated. However, within surgery, research has often attracted criticism for both the difficulties in reproducibility, lack of methodological robustness, and logistical difficulties in organizing randomized controlled trials (RCTs). More attempts have been made to improve both the quality and the quantity of research, and this is evidenced by the development of frameworks such as CONSORT and IDEAL to help standardize the approach to research within surgery.⁵⁵ As a result, the increased quantity of surgical research specifically within orthopedics has led to a proliferation of publications within the field, with 27 of the 50 most cited arti-

cles published within the last 10 years of the database.

Further work could evaluate, with greater granularity, the themes within knee surgery over time to provide a dynamic overview of research themes. Given the advances in knee surgery, it may reflect the contemporaneity of these techniques, that these themes fall considerably behind the leading theme of ‘Knee Arthroplasty’, and a dynamic overview could elucidate such trends.

In line with the work of other authors, 48 of the 50 most cited articles were published in American based journals despite only 22 of the articles being written by authors at American-based institutions (Table 2).⁵⁶ This could reflect the influence that journals based in the United States have with regards to the publication and growth of impactful papers in orthopedic surgery.

Out of the nine journals represented by the top 50 most cited papers, seven of them had impact factors above the 2016 mean of 1.9.⁵⁷ Given that impact factor is derived from the number of citations received, this suggests that the selection of papers is in keeping with articles that are considered both relevant and important within orthopedic surgery, and may have been accepted with a view to directly improving their respective journal’s overall standing.

Conclusions

This paper provides an insight into key and impactful trends within knee surgery, and at the time of writing, is the only paper to exclusively explore the 50 most cited

articles in knee surgery. Whilst this form of analysis provides a unique insight into trends and key themes in knee surgery, there are further variables that should be explored to gain a fuller and richer appreciation of the role of journals influencing advances

within the field. The trends not only identify popular areas within the specialty, but also the relative paucity of cited publications within the field, and this information can be leveraged to direct future research efforts. Furthermore, the overview of research

Table 1. The top 50 articles related to surgical intervention, with the relative number of citations.

Rank	Paper (ref)	Citations	Rank	Paper (ref)	Citations
#1	Lysholm 1982 (5)	1407	#26	Lingard 2004 (30)	352
#2	Lohmander 2007 (6)	996	#27	Marder 1991 (31)	348
#3	Ethgen, 2004 (7)	885	#28	Peterson 2010 (32)	345
#4	Daniel 1994 (8)	807	#29	Pinczewski 2007 (33)	342
#5	Knutsen 2004 (9)	805	#30	Gudas 2005 (34)	336
#6	Sharkey 2002 (10)	716	#31	Yasuda 2006 (35)	334
#7	Steadman 2003 (11)	708	#32	Obrien 1991 (36)	333
#8	Bourne 2010 (12)	656	#33	Corry 1999 (37)	322
#9	Bierbaum 1999 (13)	587	#34	Fehring 2001 (38)	321
#10	Steadman 2001 (14)	573	#35	Brander 2003 (39)	319
#11	Hangody 2003 (15)	571	#36	Kurtz 2014 (40)	314
#12	Jeffery 1991 (16)	567	#37	Chauhan 2004 (41)	313
#13	Knutsen 2007 (17)	552	#38	Hangody 1998 (42)	312
#14	Pulido 2008 (18)	539	#39	Diduch 1997 (43)	306
#15	Kurtz 2009 (19)	508	#40	Scott 2010 (44)	303
#16	Hjelle 2002 (20)	455	#41	Ranawat 1993 (45)	297
#17	Noble 2006 (21)	442	#42	Widuchowski 2007 (46)	294
#18	Ginsberg 2008 (22)	429	#43	Nejadnik 2010 (47)	292
#19	Hawker 1998 (23)	427	#44	Kerr 2008 (48)	291
#20	Peersman 2001 (24)	425	#45	Fulkerson 2002 (49)	288
#21	Glasson 2007 (25)	405	#46	Shelbourne 1991 (50)	283
#22	Freedman 2003 (26)	400	#47	Yagi 2007 (51)	280
#23	Bathis 2004 (27)	374	#48	Muneta 2007 (52)	278
#24	Baker 2007 (28)	370	#49	Harris 2001 (53)	275
#25	Kreuz 2006 (29)	354	#50	Phillips 2006 (54)	274

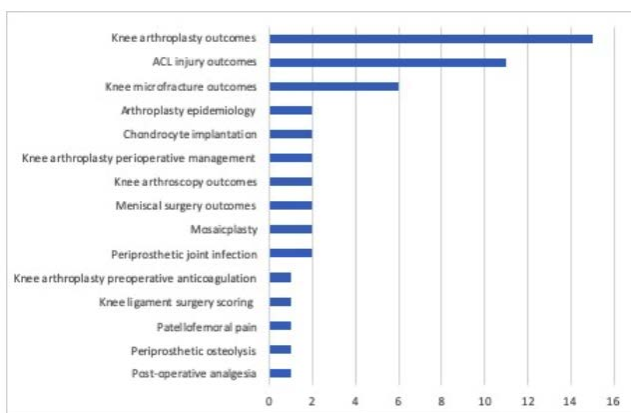


Figure 1. Graph of research themes.

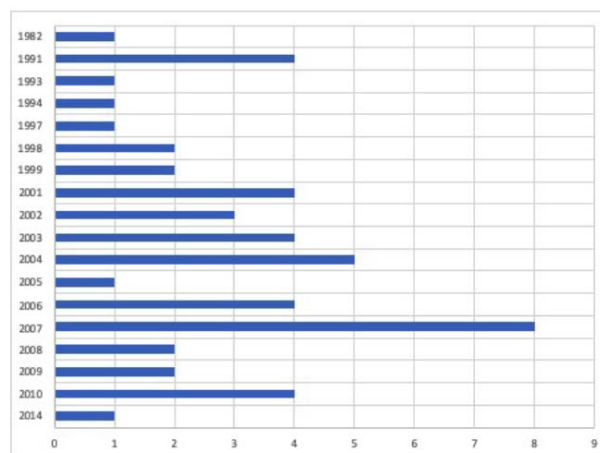


Figure 2. Graph of frequency of publications by year.

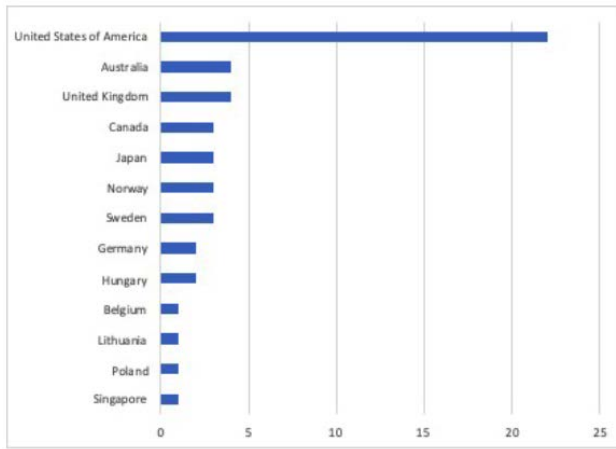


Figure 3. Graph of volume of publications by Country.

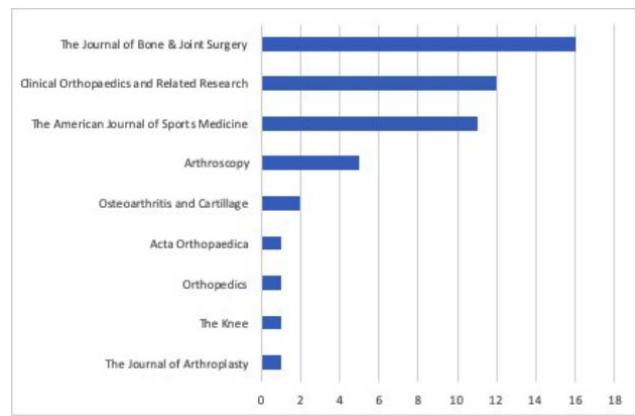


Figure 4. Graph of number of publications from top 50 most cited by journal.

Table 2. The top 50 articles distribution by journal.

Journal name	IF	No. of papers in top 50
The Journal of Bone & Joint Surgery	4.84	16
Clinical Orthopaedics and Related Research	4.09	12
The American Journal of Sports Medicine	6.06	11
Arthroscopy	4.29	5
Osteoarthritis and Cartilage	5.45	2
Acta Orthopaedica	3.22	1
Orthopedics	1.61	1
The Journal of Arthroplasty	3.52	1
The Knee	1.76	1

being conducted within the area of orthopedic knee surgery should serve to promote more informed scientific discourse between researchers, facilitating more focused exploration of research areas within the field.

Whilst scientists and researchers are often mindful of the intrinsic biases and heuristics, further analysis into paper selection and the motivating factors which underpin these decisions could potentially develop a new approach to finding articles, which can limit the impact of these heuristics. Such a framework may require a review of the most recently published articles in addition to the most cited articles to enable a balanced and informed research approach. Whilst some journals may implicitly seek out recent references, embedding this within a framework could redefine the approach to literature review.

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