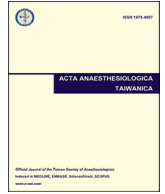




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## Research Paper

## Trend of academic publication activity in anesthesiology: A 2-decade bibliographic perspective

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## ABSTRACT

**Objectives:** The publication of anesthesiology papers presents the importance of understanding the corresponding research activity. This research used the bibliographic method to investigate the publication trend in anesthesiology using Science Citation Index Expanded over the period 1995–2014.

**Methods:** The journals listed in the subject category of anesthesiology in the 2014 *Journal Citation Reports* were selected, and bibliographic information was collected from Science Citation Index Expanded, with 128,003 papers published from 1995 to 2014. Only the document type “article” was analyzed. The productivity and impact of various journals, countries, and institutions are discussed.

**Results:** A total of 64,199 articles published from 1995 to 2014, with 1,084,491 cited times, were examined. The total number of articles published by journals showed a slight increase in the 2<sup>nd</sup> decade. More than 45% of these articles were published by the top five journals, which have maintained their ranking over 2 decades. Most publications originated from North America and European countries, of which the United States had the highest number of publications and citations. Most of the institutions are academic universities and hospitals. More than half of the top 25 institutions (in rankings) are located in the United States, and Harvard University accounted the highest number of articles and citations among all institutions.

**Conclusion:** The results reported here may aid clinicians and researchers to better understand the worldwide contribution of anesthesiology research activities over 2 decades.

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## 1. Introduction

Understanding the publication activity in the field of anesthesiology is incorporated in decisions that enhance academic advancement. To our best knowledge, the first study on this publication activity that evaluated the subject journals with citation analysis was published in 1987.<sup>1</sup> It is thus important to explore the current state of publications in anesthesiology.

A bibliometric method is the application of quantitative analysis to the publication of journals, articles, and their accompanying citation counts. A number of bibliometric studies looked at the

publishing trends in anesthesiology, whereas others examined the state of journals. Robert et al<sup>2</sup> traced the evolution of the articles published on *Pain* from 1976 to 2007. Meanwhile, Szokol et al<sup>3</sup> reported that the number of basic science and clinical research papers contributed by American authors in core anesthesiology have decreased between 1980 and 2000. Other researchers went on to examine the geographical distribution of publications and identified some of the most cited institutions.<sup>4–6</sup> In addition, Bould et al<sup>7</sup> found that the researchers from United States had the highest number of original publications, whereas Swaminathan et al<sup>8</sup> demonstrated that the United States produced the largest amount of clinical research. However, Europe has a higher capita output of clinical research than that of the United States.<sup>8</sup> Li et al<sup>9</sup> reported the publication trends in East Asia and noted a significant decrease in the number of publications from Japan. On the contrary, this report observed modest increases in the number of publications in anesthesiology research from China and South Korea from 2000 to 2009.<sup>9</sup> Concerning the academic performance of institutions,

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Terajima and Aneman<sup>5</sup> identified the 67 institutions that produced the most cited articles in the pain and analgesia literature from 1986 to 1997.

Notably, previous bibliometric studies in anesthesiology were seldom conducted for global and long-term frame. Thus, the findings of these studies may not adequately cover the changing trends in the publication of anesthesiology articles over the past 2 decades. This study seeks to close this gap in research by conducting a thorough examination of journal articles listed under the subject category of “anesthesiology” in *Journal Citation Reports* (JCR) from 1995 to 2014. The aim of this study was to examine the distribution of journals, countries, and institutions for the period 1995–2014. The time trends of articles will be explored over 2 decades. The result reported here may aid clinicians and researchers in better understanding the worldwide contribution of anesthesiology research activities.

## 2. Methods

This study retrieved data from Science Citation Index Expanded (SCI-E) over a period of 2 decades, (1995–2014) on August 18, 2015 at National Taiwan University. First, 30 source journals for the papers examined were selected in the subject category of “anesthesiology” in 2014 JCR. A total of 128,003 papers were published over this 20-year time frame. Only the document type “article” was analyzed in this study. A total of 64,199 articles with 1,084,491 citations were collected for further examined. Second, we captured the bibliographical record of each article in SCI-E and took note of its Institute for Scientific Information code, publication year, title, abstract, subject category, and references for further study. Finally, we used the following indicators to evaluate the productivity and impact of journals, countries, and institutions: total number of

articles published by the journal to determine the importance or rank of the journal; total number of articles by countries and institutions was taken as a quantity indicator of research; total number of citations by countries and institutions was taken as the quality indicator of research.

There were several ways to determine the number of papers published. As in our previous study,<sup>10</sup> the whole counting method<sup>11</sup> was used in this study. Papers with multiple authors were counted more than once when the coauthorship was transnational or interinstitutional. The time trends of articles and the results will be presented by descriptive analysis divided into 2 decades.

## 3. Results

### 3.1. Distribution of journals

There were 30 journals that published anesthesiology articles in the 2014 JCR (Table 1). A total of 64,199 articles relating to anesthesiology were selected and divided for two decades. There were 30,507 articles published from 1995 to 2004 and 33,692 articles from 2005 to 2014, indicating an approximate 10% increase in the number of articles published. Overall, articles published from all journals showed only a slight increase, whereas journal titles increased from 18 in 1995 to 30 in 2014. *Anesthesia and Analgesia*, *Anesthesiology*, *Pain*, *British Journal of Anaesthesia*, and *Acta Anaesthesiologica Scandinavica*, which could be considered the core anesthesiology journals in terms of the number of articles published, contributed 45% of the total number of articles. However, it should be noted that the top five journals, which were ranked based on the number of articles in all journals, had shown a downtrend over 2 decades, with the exclusion of *Pain*. Moreover,

**Table 1**  
Number of anesthesiology articles ranking over 2 decades.

Journal	Articles (rank)				
	1995–2004		2005–2014		Total <sup>a</sup>
<i>Anesthesia and Analgesia</i>	5337	(1)	4174	(1)	9511 (1)
<i>Anesthesiology</i>	3730	(2)	2428	(3)	6158 (2)
<i>Pain</i>	2210	(5)	2646	(2)	4856 (3)
<i>British Journal of Anaesthesia</i>	2566	(3)	2119	(4)	4685 (4)
<i>Acta Anaesthesiologica Scandinavica</i>	2294	(4)	1687	(5)	3981 (5)
<i>Anaesthesia</i>	1751	(6)	1473	(7)	3224 (6)
<i>Journal of Cardiothoracic and Vascular Anesthesia</i>	1339	(8)	1614	(6)	2953 (7)
<i>Canadian Journal of Anesthesia</i>	1744	(7)	1007	(16)	2751 (8)
<i>Annales Francaises d'Anesthesie et de Reanimation</i>	1162	(9)	1267	(9)	2429 (9)
<i>Anaesthesist</i>	1160	(10)	1131	(12)	2291 (10)
<i>European Journal of Anaesthesiology</i>	1100	(11)	1122	(13)	2222 (11)
<i>Anaesthesia and Intensive Care</i>	1006	(13)	1135	(11)	2141 (12)
<i>Journal of Clinical Anesthesia</i>	1030	(12)	838	(18)	1868 (13)
<i>Anesthesiologie Intensivmedizin Notfallmedizin Schmerztherapie</i>	878	(14)	865	(17)	1743 (14)
<i>Clinical Journal of Pain</i>	470	(17)	1047	(14)	1517 (15)
<i>Pediatric Anesthesia</i>	140	(23)	1372	(8)	1512 (16)
<i>European Journal of Pain</i>	155	(22)	1245	(10)	1400 (17)
<i>Regional Anesthesia and Pain Medicine</i>	581	(15)	726	(20)	1307 (18)
<i>Journal of Anesthesia</i>	0	(25)	1028	(15)	1028 (19)
<i>Anesthesiologie and Intensivmedizin</i>	519	(16)	369	(26)	888 (20)
<i>International Journal of Obstetric Anesthesia</i>	328	(20)	525	(21)	853 (21)
<i>Journal of Neurosurgical Anesthesiology</i>	457	(18)	384	(25)	841 (22)
<i>Der Schmerz</i>	353	(19)	484	(22)	837 (23)
<i>Minerva Anestesiologica</i>	0	(25)	789	(19)	789 (24)
<i>Journal of Clinical Monitoring and Computing</i>	181	(21)	345	(28)	526 (25)
<i>Pain Physician</i>	0	(25)	467	(23)	467 (26)
<i>Current Opinion in Anesthesiology</i>	16	(24)	447	(24)	463 (27)
<i>Pain Practice</i>	0	(25)	365	(27)	365 (28)
<i>Revista Brasileira de Anestesiologia</i>	0	(25)	343	(29)	343 (29)
<i>BMC Anesthesiology</i>	0	(25)	250	(30)	250 (30)
Total	30,507		33,692		64,199

<sup>a</sup> Rank by 1995–2014.

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